ENTOMOLOGICAL NEWS

VOLUME L, 1939

PUBLISHED BY
THE AMERICAN ENTOMOLOGICAL SOCIETY,

PHILADELPHIA, PA.:
THE ACADEMY OF NATURAL SCIENCES
LOGAN SQUARE
1939

The several numbers of the NEWS for 1939 were mailed at the Post Office at Philadelphia, Pa., as follows:

No. 1—January	January 26, 1939
" 2—February	February 9
" 3—March	March 10
" 4—April	April 13
" 5—May	May 10
" 6—June	June 16
" 7—July	July 18
" 8—October	October 6
" 9—November	November 6

The date of mailing the December, 1939, number will be announced on the last page of the issue for January, 1940.

ENTOMOLOGICAL NEWS

Vol. L. JANUARY, 1939 No. 1

Butterflies of a Wood Road at Suffolk, Virginia.

By Austin H. Clark and Leila F. Clark, U. S. National Museum, Washington, D. C.

Seventy-three species of butterflies we have found along a half-mile stretch of abandoned woodland road on the northwestern border of the Dismal Swamp parallel to a lumber railway on the outskirts of Suffolk, Virginia. Such a wealth of butterflies, including so many rarities, in a restricted and easily accessible locality is unusual and seems worth recording. Indeed, more species undoubtedly are to be found there, for our visits to the region have been few, and our time on each visit limited to a few hours. Furthermore, every visit has yielded species we had not seen before, and in the more or less immediate vicinity we have found nine additional species that might well occur there.

Perhaps the most interesting butterfly here is *Enodia creola* which is found in the cane (*Arundinaria gigantea*) along the road for a distance of about 150 feet. Here we once took twenty-one specimens in a couple of hours. Since then we have paid little attention to it, but have noted its constant presence. Everywhere along the road, except in this special region, *E. portlandia* is abundant.

Inconspicuous and always keeping near the ground, feeding on the flowers of violets, *Prunella* or *Elephantopus* according to season, is the little skipper *Amblyscirtes carolina.* It is not very common, but you may see as many as a dozen in the course of a morning. Usually you will see three or four—sometimes none. Much more numerous and conspicuous is *A. textor,* which is sometimes abundant. On two brief visits two days apart, just before the middle of June, Mr. and Mrs. E. L. Bell secured sixty and we secured fifty-eight, after which we passed them by.

From time to time you notice the strangely inert *Atrytone dion* in the grass, and occasionally the wary *Poanes yehl* or *Atrytone logan,* the last named of large size. Incidentally it is the northern form of *Atrytone dion* that is found here, not the smaller, darker, southern form (*alabamae*) found further northward in the Dahl Swamp in Accomac County on the Eastern Shore.

Near the trees burdened with mistletoe on the southern edge of the road you sometimes notice the unsuspicious and stupid *Atlides halesus,* and in the grass, if you look closely, you may find *Nymphidia pumila* perched head downward with wings outspread.

Naturally, all of the butterflies we have found here do not occur at the same season, nor are they equally abundant in different years. Most of the more unusual ones are commonest in a wet season—rain with intervals of sunshine.

In the course of our investigations we have covered every section of Nansemond, Norfolk and Princess Anne Counties. Most of this area, more or less extensively drained and intensively cultivated, is singularly devoid of butterflies, even of the commonest species. When butterflies do occur they are mainly the species of barren country and waste lands, or of weedy roadsides. In the height of the season many gardens yield no butterflies at all, while in others you find only *Vanessa virginiensis, Euptoieta claudia, Pieris rapae, Atalopedes campestris, Hylephila phylaeus* and *Panoquina ocola,* with an occasional swallowtail, usually *Papilio glaucus* or *P. troilus,* and sometimes *Terias lisa* and *Phoebis eubule.* Only in localized and usually widely separated regions are the more interesting species found.

There are some other spots that are very rich, perhaps as rich as this woodland road, but we have not worked them so intensively. And still others are notable for the occurrence in numbers of a particular species.

As an example, along the main highway (route 10) about two miles west of Spring Grove, Surry County, we have found *Argynnis diana* more numerous than we have ever seen it else-

where. Mrs. Barnes, who very kindly gave us permission to look over her garden, told us that she had seen as many as twenty-five at one time about her butterfly-bush.

The wood road is reached as follows: Starting from the Hotel Elliott opposite the Post Office at Suffolk you go southeast on Main Street for two blocks, then turn left onto Washington Street. Following Washington Street for about a mile you come to a fork with an Esso station in it. Bearing to the right on the White Marsh road past the Esso station you come in less than a mile to a lumber railway that crosses the road. Just beyond this railway crossing, on the left, is a large lumber yard. Turn to the left at the company store and, securing permission from the "boss-man," park your car in the lumber yard. Going to the lumber railway, you will see that it goes down a short incline into the Dismal Swamp. At the bottom of the incline leave the railway, cross the dry ditch on its north side and, passing through the brush, you immediately find yourself on the wood road.

The butterflies for which we have records from along this road and the nearby lumber railway are the following:

SATYRIDAE: *Neonympha gemma* (Hübner), *N. eurytus* (Fabricus), *N. sosybius* (Fabricius), *Cercyonis alope alope* (Fabricius), *Enodia portlandia portlandia* (Fabricius), *E. creola* (Skinner).

NYMPHALIDAE: *Polygonia interrogationis* (Fabricius), *P. comma* (Harris), *Nymphalis antiopa creta* (Verity), *Vanessa atalanta* (Linné), *V. virginiensis* (Drury), *V. cardui* (Linné), *Precis coenia* Hübner, *Basilarchia arthemis astyanax* (Fabricius), *B. archippus* (Cramer), *Phyciodes tharos* (Drury), *Argynnis diana* (Cramer), *A. cybele* (Fabricius), *Euptoieta claudia* (Cramer).

DANAIDAE: *Danaus plexippus* (Linné).

RIODINIDAE: *Nymphidia pumila* Boisduval and LeConte.

LYCAENIDAE: *Lycaenopsis argiolus pseudargiolus* (Boisduval and LeConte), *Everes comyntas* (Godart), *Atlides halesus* (Cramer), *Strymon m-album* (Boisduval and LeConte), *Strymon cecrops* (Fabricius), *Strymon melinus* (Hübner).

PIERIDAE: *Pieris rapae* (Linné), *P. protodice* Boisduval and LeConte, *Euchloë genutia* (Fabricius), *Phoebis eubule* (Linné), *Colias philodice philodice* Godart, *C. p. eurytheme*

Boisduval and LeConte, *Terias nicippe* (Cramer), *T. lisa* (Boisduval and LeConte).

PAPILIONIDAE: *Papilio philenor* Linné, *P. polyxenes asterius* Cramer, *P. cresphontes* Cramer, *P. glaucus* Linné, *P. troilus* Linné, *P. palamedes* Drury, *P. marcellus* Cramer.

HESPERIIDAE: *Epargyreus clarus* (Cramer), *Achalarus lyciades* (Geyer), *Thorybes bathyllus* (Smith), *T. pylades* (Scudder), *T. confusis* Bell, *Pyrgus communis* (Grote), *Pholisora catullus* (Fabricius), *Erynnis icelus* (Scudder and Burgess), *E. brizo* (Boisduval and LeConte), *E. juvenalis* (Fabricius), *E. horatius* (Scudder and Burgess), *E. terentius* (Scudder and Burgess), *Ancyloxypha numitor* (Fabricius), *Hylephila phylaeus* (Drury), *Atalopedes campestris* (Boisduval), *Polites verna* (W. H. Edwards), *P. manataaqua* (Harris), *P. themistocles* (Latreille), *P. peckius* (Kirby), *Wallengrenia otho egeremet* (Scudder), *Poanes zabulon* (Boisduval and LeConte), *P. yehl* (Skinner), *Atrytone aragos* (Boisduval and LeConte), *A. logan* (W. H. Edwards), *A. dion* (W. H. Edwards), *A. ruricola* (Boisduval), *Lerema accius* (Smith), *Amblyscirtes textor* (Hübner), *A. carolina* (Skinner) (and var. *reversa* Jones), *Lerodea l'herminier* (Latreille), *Panoquina ocola* (W. H. Edwards).

The butterflies of this region that we have not found along this woodland road are: *Neonympha areolatus areolatus* (Hübner), found a few miles southwest; *N. a. septentrionalis* Davis, a few miles south and southwest; *Satyrodes eurydice* (Linné), a few miles west; *Dione vanillae incarnata* Riley, a few miles northeast; *Mitoura gryneus* (Hübner), a few miles northwest; *Urbanus proteus* (Linné), a few miles east; *Pholisora hayhurstii* (W. H. Edwards), a couple of miles south; *Erynnis martialis* (Scudder), a few miles south; *Poanes viator* (W. H. Edwards), a few miles northwest; *Atrytone dukesi* Lindsey, gum swamp at North Landing; *Lerodea eufala* (W. H. Edwards), within a mile, in open fields; *Calpodes ethlius* (Cramer), a pest on canna in Suffolk in 1937.

Some of these undoubtedly occur along the woodland road from time to time, but others live in specialized habitats from which they do not stray. Still other species have been recorded from this region, but have not been found by us.

Mr. Frank Morton Jones deserves the credit for first having

called attention to this region, he having collected along the lumber railway. Mr. Ernest L. Bell was the next visitor. On two days last June we had the pleasure of visiting the wood road in company with Professor and Mrs. Charles T. Brues and Miss Alice Brues, and Mr. and Mrs. E. L. Bell. Others who have collected in this locality are Dr. G. W. Rawson of Detroit, Mr. W. Herbert Wagner of Washington, and Mr. John Boyd of Southern Pines, N. C. All of these have been so very kind as to send us their records.

A Bibliography of Keys for the Identification of Immature Insects. Part I. Diptera.

By Wm. P. Hayes, University of Illinois.

(Continued from Vol. XLIX, page 251.)

Simuliidae.

Edwards, F. W. 1920. On the British species of *Simulium* II. The early stages; with corrections and additions to Part I. *Bull. Ent. Res.*, 11:211-246. (Key to species of larvae and pupae, pp. 219-223.)

Id. 1934. The Simuliidae (Diptera) of Java and Sumatra. *Archiv. Hydrobiol.*, Band 13, Suppl. Heft. 1, pp. 92-138. (Larval and pupal keys to species, pp. 101-103.)

Emery, W. T. 1913. The morphology and biology of *Simulium vittatum* and its distribution in Kansas. *Kansas Univ. Sci. Bul.*, 8:323-362. (Keys to larvae and pupae, pp. 350-351.)

Johannsen, O. A. 1903. [Simuliidae of the United States.] *N. Y. State Mus. Bul.* 68, pp. 336-388. (Key to larvae and pupae, pp. 353-354.)

Lutz, A. 1910. Segunda contribuicao para o conhecimento das especies brazileiras do genero Simulium. *Mem. Inst. Oswaldo Cruz.* 2:213-267. (Key to pupae of Brazilian species in Spanish and German, pp. 263-267.)

Malloch, J. R. 1914. American black-flies or buffalo-gnats. *U. S. Dept. Agr., Bur. Ent. Tech. Bull.* 26. (Table of larvae, p. 14, table of pupae, p. 15.)

Puri, I. M. 1925. On the life history and structure of the early stages of Simuliidae (Diptera). Parts I and II. *Parasitology,* Vol. 17, Pt. I, pp. 295-334, Pt. II, pp. 335-369. (In part II, key to full grown British larvae and pupae, pp. 334-337.)

Twinn, C. R. 1936. The black-flies of eastern Canada (Simuliidae, Diptera). *Canad. Jour. Res.* 14; Sec. D., pp. 97-130 and pp. 131-150. (Key to pupae.)

Chironomidae.

Spärch, R. 1922. Bieträge zur Kenntnis der Chironomidenmetamorphose. I-IV. Part I. Kronologische Ubersicht der bisher veröffentlichten Litteratur über Chironomidenlarven und Chironomidenmetamorphose. *Ent. Meddel.* 14: 32-109. (This has no keys but should be consulted by anyone interested in the life stages of this family,—a chronological history and good bibliography).

Johannsen, O. A. 1905. Mayflies and midges of New York. *N. Y. State Mus. Bull.* 86: 76-331. (Keys to species of larvae and pupae, pp. 87-88.)

Id. 1937. Aquatic Diptera, Part III. Chironomidae: Subfamilies Tanypodinae, Diamesinae, and Orthocladiinae. *Cornell Agr. Exp. Sta. Mem.* 205, pp. 1-84, 18 pl.

Karny, H. H. 1934. Biologie der Wasserinsekten. Fritz Wagner, Wien, 311 pp. (Key to genera and species of Tendipedidae-Chironomidae, pp. 208-213.)

Krüger, F. 1938. Tanytarsus-studien I. Die subsectio Atanytarsus. Zugleich variationsstatistiche Untersuchungen zum Problem der Artbildung bei Chironomiden. *Arch. Hydrobiol.* 33: 208-256. (Key species of larvae of Cladotanytarsus, pp. 221-222.)

Lenz, F. 1921. Chironomidenpuppen und Larven. Bestimmungstabellen. *Deutsche Ent. Zeit.*, 1921, pp. 148-162. (Keys to larvae and pupae.)

Malloch, J. R. 1915. Chironomidae or midges of Illinois, etc. *Bull. Ill. State Lab. Nat. Hist.*, 10: 275-543. (Keys to larvae and pupae, pp. 364-366 and 401-410.)

Id. 1917. Preliminary classification of Diptera, etc. Part I. (Part II was never published.) *Bull. Ill. State Lab. Nat. Hist.*, 12: 161-409. (Keys to subfamily, genera and species of larvae and pupae, p. 286-290.)

Thienemann, A. 1908. Über die Bestimmung der Chironomidenlarven und Puppen. *Zool. Anz.* 33: 753-756. (Key to genera of larvae and pupae, pp. 754-756.)

Id. 1914-1921. Vorarbeiten fur eine Monographie der Chironomiden-Metamorphose. *Archiv. Hydrobiol.* Suppl. Band II. 850 pp. This work, edited by Thienemann, contains the following papers by various authors which contain keys to Chironomidae.

Bause, E. 1914. Die Metamorphose der Gattung *Tanytarsus*

und einiger verwanter Tenipediden-arten. pp. 1-128. (Larval key to species, pp. 42-46, pupal key to species, pp. 89-93.)

GRIPEKOVEN, H. 1914. Minierende Tendipediden. pp. 129-230. (Various keys to larvae and pupae of these leaf-mining Chironomids.)

POTTHAST, A. 1915. Uber die Metamorphose der Orthocladius-Gruppe. pp. 243-376. (Key to species of larvae and pupae, pp. 252-257.)

REITH, J. T. 1915. Die Metamorphose der Culicoiden (Ceratopoginen). Pp. 377-442. (Various keys to larvae and pupae.)

THIENEMANN, A. 1921. Metamorphose der Tanypinen. Part I, pp. 566-654; Part II, pp. 655-784. (Keys to larvae and pupae, pp. 667-674; see also tables after p. 644.)

ID. 1921. Die Metamorphose der Chironomidengattungen Camptocladius, Dyscamptocladius und Phaenocladius mit Bemerkungen über die Artdifferenzierung bei den Chironomiden überhaüpt. Pp. 809-850. (Various keys to larvae and pupae of these genera.)

THIENEMANN, A. 1924. Über die Chironomidengattung *Lundstromia* nebst einer Bestimmungstabelle für die Larven und Puppen der Sectio *Tanytarsus*. *Zool. Anz.* 58: 331-345. (Key to genera and species of larvae and pupae, pp. 331-345.)

ID. 1928. Chironomiden-Metamorphosen I. *Archiv. Hydrobiol.* 19: 585-623. (Various keys to larvae and pupae of Ceratopogininae.)

ID. 1929. Chironomiden Metamorphosen II-Die Sectio Tanytarsus genuinus. *Archiv. Hydrobiol.* 20: 93-123. (Various keys to larvae and pupae of this group.)

ID. 1934. Chironomiden-Metamorphosen III. Zur metamorphose der Orthocladiariae. *Deut. Ent. Zeit.* for 1933, p. 1-38. (Various keys to larvae and pupae.)

ID. 1935. Chironomiden-Metamorphosen. X. Orthocladius-Dactylocladius (Diptera). *Stettin. Ent. Ztg.* 96: 201-224.

ID. 1935. Chironomiden-Metamorphosen XII. *Deutsche. Ent. Zeit. Jahrgang* 1935 Heft, 1 and 2, p. 86-96. (Pupal key to sp. of *Brilla*, p. 94.)

ID. 1936. Chironomiden-Metamorphosen XI. Die Gattung Eukiefferiella. *Stett. Ent. Zeit.* 97: 43-65. (Larval key pp. 45-47 and pupal key pp. 48-50.)

ID. 1936. Chironomiden-Metamorphosen XIII (Diptera). Die Gattung Dyscamptocladius Thien. *Mitt. der Deut. Ent. Gesell. E. V.* 7: 49-54. (Key to species of larvae and pupae, pp. 50-52.)

Id. 1937. Chironomiden aus Lapland. III. Beschreibung neuer Metamorphosen, mit einer Bestimmungstabelle der bisher bekannten Metriocnemuslarven und-puppen. *Stett. Ent. Zeit.*, 98: 165-185. (Larval and pupal keys to species of Metriocnemus.)

Thienemann, A. and O. Harnisch, 1932. Chironomiden Metamorphosen IV. Die Gattung *Cricotopus*. *Zool. Anz.* 99: 133-143. (Keys to a few genera included in the Cricotopus group.)

Thienemann, A. and K. Mayer. 1933. Chironomiden Metamorphosen VI. *Zool. Anz.*, 103: 1-12. Larval and pupal keys to species of the Diamesa group, pp. 9-12.)

Zarvel, J. 1928. Die Jugendstadien der Tribus Corynoneurariae. *Archiv. Hydrobiol.* 19: 651-665. (Keys to larvae and pupae of genera and species, pp. 662-665.)

Id. 1933. Larven und Puppen der Tanypodin von Sumatra und Java. *Archiv. Hydrobiol.*, Suppl. Band 11, pp. 604-624.

Id. 1934. Tanytarsus larven und puppen aus Niederländisch-Indien. *Archiv. Hydrobiol.*, Suppl. Band 13. Heft 1. Pp. 139-165. (Contains various keys to species of larvae and pupae.)

Ceratopogonidae.

Karny, H. H. 1934. Biologie der Wasserinsekten. Fritz Wagner, Wien, 311 pp. (Key to genera, pp. 207-208.)

Kieffer, J. J. 1901. Zur Kenntniss der Certopogon-larven. *Algm. Zeit. Ent.*, 6: 216-220. (Key to species, pp. 216-217.)

Lenz, F. 1934. Die Metamorphose der Heleidae. In: *Die Fliegen der Palaerktischen Region* by *E. Lindner*. Lief. 78: 95-128. (Key to genera of larvae and pupa, pp. 98-99; and various keys to species.)

Malloch, J. R. 1915. Chironomidae, or midges of Illinois. *Bull. Ill. State Nat. Hist. Surv.*, Vol 10, pp. 275-543. (See also Malloch, 1917, in general list.)

Mayer, K. 1934. Ceratopogoniden-Metamorphosen (*C. intermediae* and *C. vermiformes*) der Deutschen Limnologischen Sundra-Expedition. *Archiv. Hydrobiol.*, Suppl. Band 13, Heft 1, pp. 166-202. (Keys to eggs, larvae and pupae of the two groups cited in title, pp. 170-172 and 182-185.)

Reith, J. T. 1915. Die Metamorphose der Culicoiden (Ceratopogonien). *Archiv. Hydrobiol.*, Suppl. Band 2, pp. 377-442. (Various keys to larvae and pupae.)

Thienemann, A. 1928. Chironomiden Metamorphosen I. *Archiv. Hydrobiol.*, 19: 585-623. (Various keys to larvae and pupae.)

PSYCHODIDAE.

HALIDAY, A. H. 1856. Psychodidae. In: *Walker, British Diptera,* Vol. 3, pp, 253-263. (Key to genera of larvae, p. 25.)

HAZEMAN, L. 1907. A monograph of North American Psychodidae. *Trans. Amer. Ent. Soc.,* 33: 299-333. (Key to three European larval genera, p. 325.)

MIALL, L. C. and N. WALKER. 1895. The life-history of *Pericoma canescens* (Psychodidae). *Trans. Ent. Soc. Lond.,* for 1895, pp. 141-153. (A reprint of Haliday's key, p. 150.)

MUTTKOWSKI, R. A. 1915. New insect life histories I. *Bull. Wis. Nat. Hist. Soc.,* 13: 109-122. (Key to North American larvae, pp. 111-112.)

See also: Johannsen, 1934, and Malloch, 1917, in general list.

DIXIDAE.

GOETGHEBUER, M. 1921. Les Dixidae de Belgique. *Bull. Soc. Ent. Belg.,* 3: 183-188. (Key to larvae; paper not seen.)

SMITH, F. K. 1928. Larval characters of the genus Dixa. *Jour. N. Y. Ent. Soc.,* 36: 263-284. (Key to species of larvae.)

See also: Johannsen, 1903 and 1934, in general list.

CULICIDAE.

BRAGA, J. M. 1931. Culicideos de Portugal. Aránjo and Sobrinko, Porto. (Keys to larvae of Culex, pp. 31-32; Aedes, pp. 52-53, and Anopheles, pp. 73-74.)

BUXTON, P. A. and G. H. E. HOPKINS. 1925. The early stages of Samoan Mosquitoes. *Bull. Ent. Res.,* 15: 295-301. (Key to larvae and pupae, p. 301.)

CHRISTOPHERS, S. R. 1933. Culicidae, tribe Anophelini. In: *Fauna of British India.* Diptera, Vol. 4. (Key to larvae, pp. 84-90; eggs, 90-94.)

COOLING, L. E. 1924. Larval stages and biology of the commoner Australian Mosquitoes. *Comm. Aust. Dept. Health Service,* Melbourne, Publ. No. 8, pp. 1-40. (Paper not seen.)

DYAR, H. G. 1906. Larvae of Culicidae classified as independent organisms. *Jour. N. Y. Ent. Soc.,* 14: 169-230. (Many keys throughout the work.)

ID. 1906. Key to the known larvae of the mosquitoes of the United States. *U. S. Dept. Agr. Bur. Ent. Circ.,* 72: 1-6.

ID. 1928. The mosquitoes of the Americas. *Carnegie Inst. Wash.,* Pub. 387: 616 pp., 123 pls. (Various keys to larvae, no pupal keys.)

EDWARDS, F. W. 1912. Revised keys to the known larvae of African Culicinae. *Bull. Ent. Res.,* 3: 373-385. (Key to genera and species, p. 373.)

Id. 1912. A revision of the mosquitoes of the palaearctic region. *Bull. Ent. Res.*, 12: 263-351. (Several keys to larvae of various genera.)

Id. 1932. Culicidae. *Gen. Ins.*, Fasc. 194, pp. 1-258. (Various larval keys to genera of the world.)

Felt, E. P. 1904. Mosquitoes or Culicidae of New York State. *N. Y. Mus. Bull.* 79, Ent. 22, pp. 241-400. (Larval key, p. 279.)

Fox, C. 1925. Insects and disease of man. Blakiston's Son and Co., Phila., 349 pp. (Keys to larvae from Howard, Dyar, and Knab, pp. 28, 30, and 32.)

Grünberg, K. 1910. [Genera of German Culicidae.] In: *Brauer, Süsswasserfauna Deutschlands,* Heft 2A. 312 pp. Fischer, Jena. (Key to larval genera, p. 80.)

Headlee, T. J. 1921. Mosquitoes of New Jersey. *N. J. Agr. Exp. Sta.*, Bull. 348, 229 pp. (Key to larvae, pp. 20-23; "eye and hand lens key" to larvae, p. 30.)

Hegner, R., F. M. Root, and D. L. Augustine. 1929. Animal parasitology with special reference to man and domesticated animals. Century Biol. Series, Century Co., N. Y., 731 pp. (Larval key to tribes, p. 482; *Anopheles,* p. 497; various genera, p. 520 and p. 522.)

Herms, W. B. 1923. Medical and veterinary entomology. 2nd ed., 462 pp. Macmillan Co., N. Y. (Larval keys to *Anopheles* from Howard, Dyar and Knab, p. 126.)

Hopkins, G. H. E. 1936. Mosquitoes of the Ethiopian region I. Larval bionomics of mosquitoes and taxonomy of culicine larvae. London. (British Museum.) 1936, 250 pp. (Various larval keys to species.)

Howard, L. O., H. G. Dyar and F. Knab. 1914-1917. The mosquitoes of North and Central America and the West Indies. 4 Vols., Carnegie Inst., Wash., D. C. (Various larval keys in Vols. 2 and 3.)

Ingram, A. and J. W. S. Macfie. 1917. Notes on some distinctive points in the pupae of West African mosquitoes. *Bull. Ent. Res.*, 8: 73-91. (Keys to species of pupae.)

James, S. P. and W. G. Liston. 1911. A monograph of the anopheline mosquitoes of India. Thacker, Spink & Co., Calcutta, 128 pp. (Key to genera and species of larvae, pp. 50-58.)

Johannsen, O. A. 1903. Culicidae. In: *N. Y. St. Mus., Bull.* 68, pp. 388-429. (Key to genera of larvae and pupae, pp. 391-392; species of *Culex,* p. 415; *Aedes,* p. 425; *Corethra,* p. 393.)

(To be continued.)

A Synopsis of the Odonata of Alaska.

By Leonora K. Gloyd, Chicago Academy of Sciences, Chicago, Illinois.

Until recently most of the specimens of Odonata recorded from Alaska were taken by men whose task was to gather as many objects of natural history as time and facilities permitted, by collectors who were obliged to obtain as many specimens in all orders of insects as possible, or by men in other fields of activity who took time from their own work to capture a few insects for entomological friends. Naturally the Odonata, a group often difficult to catch and to preserve, would not be well represented in such collections.

The first dragonflies reported from Alaska (Hagen 1856, 1857 and 1861), representing four species, were taken between 1823 and 1839 in the vicinity of Sitka, Norton Sound and Kenai Island, by some adventurous Russian explorers who skirted the north Pacific coast-line from the Kurile Islands north of Japan to San Francisco, California. Apparently the next specimens taken (Hagen 1875, Walker 1912 and 1925) are from Fort Yukon, collected by W. H. Dall, probably during his survey of The Yukon River in 1867. In 1890 Hagen recorded another species from Sitka but did not give the date of collection or the name of the collector. In 1894, J. A. Cadenhead secured a specimen from Burrough's Bay (Walker, 1912). In 1899 members of the Harriman Alaska Expedition obtained eight species, six of which were new to the known fauna (Currie 1901, 1904); later in the same year Rev. S. Hall Young and J. Murray Presnall collected two dragonflies from the interior between Mission and Forty-Mile Creeks and at Eagle City (Holland, 1900). In 1908 another species was recorded without data by Martin. Sometime prior to 1917 a species new to the fauna was taken by A. Stecker from the Kuskokwim River (Kennedy 1917 and Walker 1925). Except for a series of specimens of a previously reported species collected in 1917 by J. S. Hine at Katmai (Walker 1925), apparently no more were taken until 1933 when R. R. Sheppard, a student from

the University of Florida, visited Admiralty Island, securing ten species and adding three to the list (Gloyd 1938). Thus, almost a hundred years of incidental collecting yielded only a total of eighteen species. Then in the summer of 1937 Carsten Ahrens went to Alaska primarily for the purpose of collecting Odonata and, although the season was unusually cold, was successful not only in finding all but four of the previously reported species but also six additional ones (Ahrens 1938).

From this review of the literature it is evident that few collections have been recorded and that little is known about the distribution of even the most common species in the region. Many of the records are in diverse publications some of which are now difficult of access and it is hoped that the following synopsis and bibliography may facilitate the studies of others and may help to increase interest in the odonate fauna of this far north land.

References under each species are given in chronological order and those repeating earlier records are omitted in the list unless they are of taxonomic importance. As much as permitted by available data, the earliest and latest dates of collection are also included.

LEUCORRHINIA BOREALIS Hagen. Anchorage, Gulkana (Ahrens 1938*b*, p. 227). July 17-27.

L. HUDSONICA (Selys). Kukak Bay, Virgin Bay (Prince William Sound) (Currie 1901, pp. 221-222); Admiralty Island (Gloyd 1938, p. 199); Chitina, Gulkana, Juneau, Ketchikan (Ahrens 1938*b*, p. 226). June 25-August 26.

L. PROXIMA Calvert. Anchorage (Ahrens 1938*b*, p. 227). July 22.

LIBELLULA QUADRIMACULATA Linné. Fox Point (Currie 1901, p. 221, as *Leptetrum quadrimaculata*); Juneau (Ahrens 1938*b*, p. 226). July 11-26.

SYMPETRUM DANAE (Sulzer). Admiralty Island (Gloyd 1938, pp. 198, 199); Juneau (Ahrens 1938*b*, p. 226). August 5-21.

S. DECISUM (Hagen). Chitina (Ahrens 1938*b*, p. 226). July 28.

CORDULIA SHURTLEFFI Scudder. Kukak Bay, Fox Point (Currie 1901, p. 220); Anchorage, Gulkana, Juneau, Palmer *(Ahrens 1938*b*, p. 226); Fort Yukon.[1] June 25-July 26.

SOMATOCHLORA ALBICINCTA (Burmeister). Fort Yukon (Hagen 1875, pp. 59-60, as *Epitheca albicincta*); Kodiak, Kukak Bay (Currie 1901, p. 221; Walker 1925, p. 172); Katmai (Walker 1925, p. 173); Admiralty Island (Gloyd 1938, p. 199); Anchorage, Juneau, Palmer (Ahrens 1938*b*, p. 226). June 25-August 26.

S. HUDSONICA (Hagen). Fort Yukon (Walker 1925, p. 180). June 25.

S. SAHLBERGI Trybom. Kuskokwim River (Kennedy 1917, pp. 229-236, pl. 13, as *walkeri* n. sp.; Walker 1925, pp. 163-167).

S. SEMICIRCULARIS (Selys). Admiralty Island (Gloyd 1938, pp. 198, 199); Juneau (Ahrens 1938*b*, p. 226). July 11-August 25.

AESHNA EREMITA Scudder.[2] Alaska (Martin 1908, p. 37, as *clepsydra;* Muttkowski 1910, p. 111); Bethel, Kuskokwim River[3] (Walker 1912, p. 126); Admiralty Island (Gloyd 1938, p. 199); Anchorage, Chitina, Gulkana, Palmer (Ahrens 1938*b*, p. 226). July 19-August 19.

AE. INTERRUPTA INTERRUPTA Walker. Admiralty Island (Gloyd 1938, pp. 198, 199); Ketchikan (Ahrens 1938*b*, p. 226). July 8-August 19.

AE. INTERRUPTA LINEATA Walker. Chitina, Palmer (Ahrens 1938*b*, p. 226). July 19-28.

AE. JUNCEA (Linné). Kenaï Island, Norton Sound (Hagen 1856, pp. 369, 380; 1861, pp. 120-121); Kodiak, Unga Island

[1] Hagen, 1875, p. 60, says "The specimen from Ft. Yukon, Alaska, quoted as *C. Shurtleffi* Dall, belongs to a different species," but no other reference to this specimen was found in the literature. However, in 1935, I examined 5♂ 3♀, collected June 25 by W. H. Dall at Fort Yukon, of *C. shurtleffi* in the U. S. National Museum.

* After the present paper was in type it was noted that Mr. Ahrens in his published list records this locality as "Matanuska Valley."

[2] Currie, 1901, lists *Aeshna clepsydra* (Say) (= *eremita*, Walker 1912, p. 119) as previously reported, but from the literature cited by him I found no definite Alaskan record.

[3] Recorded as Kuskoquin River by Walker, *ll. cc.*

(Shumagin Islands), Nushagak River (Currie 1901, pp. 219-220; Walker 1912, p. 91); Bethel, Kuskokwim River[3] (Walker 1912, p. 91); Admiralty Island (Gloyd 1938, p. 199); Anchorage, Gulkana, Juneau, Ketchikan, Palmer, Seward, Valdez (Ahrens 1938*a*, pp. 8-9, 26; 1938*b*, p. 226). July 11-August 25.

AE. PALMATA Hagen. Kodiak, Cook Inlet (Currie 1901, pp. 219-220, as *constricta* (Say); Walker 1912, p. 163); Admiralty Island (Gloyd 1938, p. 199); Juneau, Palmer (Ahrens 1938*b*, p. 225). July 11-August 21.

AE. SITCHENSIS Hagen. Sitka (Hagen 1861, pp. 119-120, type description; 1890*b*, pp. 353-355); Burrough's Bay (Walker 1912, p. 83); Juneau, Palmer (Ahrens 1938*b*, p. 225). July 19-August 6.

ANAX JUNIUS (Drury). Sitka (Hagen 1890*a*, p. 306); mountains between Mission and Forty-Mile Creeks, Eagle City (Holland 1900, p. 382). July 25-August 3.

CORDULEGASTER DORSALIS Hagen. Sitka (Hagen 1856, pp. 367, 381; *in* Selys 1857, p. 347, type description; 1861; p. 116; 1875; p. 50).

AGRION RESOLUTUM Hagen. Anchorage, Gulkana, Palmer (Ahrens 1938*b*, p. 227). July 17-27.

ENALLAGMA BOREALE Selys. Cook Inlet, Juneau, Kukak Bay (Currie 1901, pp. 218-219, as *calverti* Morse); Admiralty Island (Gloyd 1938, p. 199); Gulkana, Awk Lake (Juneau), Matanuska, Palmer (Ahrens 1938*b*, p. 227). June 29-August 25.

E. CYATHIGERUM (Charpentier). Sitka (Hagen 1856, pp. 367, 381; 1861, p. 87, as *Agrion annexum*, n. sp.); Admiralty Island (Gloyd 1938, p. 200); Awk Lake (Juneau), Palmer (Ahrens 1938*b*, p. 227). July 19-August 26.

LESTES DISJUNCTUS Selys. Fox Point (Currie 1901, p. 217, as *Lestes* sp.; Muttkowski 1910, p. 37); Admiralty Island (Gloyd 1938, p. 200); Anchorage, Gulkana, Juneau, Palmer (Ahrens 1938*b*, p. 227). July 19-August 26.

L. DRYAS Kirby (*uncatus* Kirby). Chitina (Ahrens 1938, p. 227). July 28.

Hagen (1856, p. 381) mentioned *Aeshna borealis* Zett. (= *caerulea* Ström) from Sitka "von Brandt in Hamburg" but I regard this record as questionable. While it is possible that this may represent *A. caerulea septentrionalis* Burm., Hagen's reference is not included in the synonymy of this species by Walker (1912, p. 76) and its occurrence in Alaska has not been verified.

Bibliography.

Ahrens, Carsten. 1938*a*. The commonest snakefeeder. The Alaska Sportsman, vol. 4, no. 5, pp. 8-9, 26.

Id. 1938*b*. A List of Dragonflies (Odonata) taken in Southern Alaska. Ent. News, vol. 49, no. 8, pp. 225-227.

Currie, Rolla P. 1901. Papers from the Harriman Alaska Expedition. XXII. Entomological Results (14): The Odonata. Proc. Washington Acad. Sci., vol. 3, pp. 217-223. Reprinted in 1904 *in* Harriman Alaska Expedition, vol. 8, pp. 145-153.

Gloyd, Leonora K. 1938. Notes on some dragonflies (Odonata) from Admiralty Island, Alaska. Ent. News, vol. 49, no. 7, pp. 198-200.

Hagen, Hermann. 1856. Die Odonaten-Fauna des russichen Reichs. Stettin ent. Zeitung., vol. 17, pp. 363-381.

Id. 1861. Synopsis of the Neuroptera of North America, with a list of the South American species. Smithsonian Misc. Coll., pp. xx + 1-347.

Id. 1875. Synopsis of the Odonata of North America. Proc. Boston Soc. Nat. Hist., vol. 18, pp. 20-96.

Id. 1890*a*. Synopsis of the Odonata of North America, No. 2. The genus Anax. Psyche, vol. 5, Feb., pp. 303-308.

Id. 1890*b*. Two species of Aeschna. Psyche, vol. 5, June, pp. 353-355.

Holland, W. J. 1900. Alaska insects. Ent. News, vol. 11, no. 3, pp. 381-389.

Kennedy, Clarence Hamilton. 1917. A new species of *Somatochlora* (Odonata) with notes on the *cingulata* group. Canadian Entom., vol. 49, pp. 229-236, pl. 13, textfigs. 1-4, 25-47.

Kirby, W. F. 1890. A synonymic catalogue of Neuroptera Odonata or dragonflies, with an appendix of fossil species. London, Gurney and Jackson, pp. x + 1-202.

Martin, René. 1906. Collections Zoologiques du Baron Edm. de Selys-Longchamps. Catalogue systematique et descriptif. Cordulines. Fasc. 17, pp. 1-98, pls. 1-3.

Id. 1908. Ibid. Aeschnines. Fasc. 18, pp. 1-84, pls. 1-2.

MUTTKOWSKI, RICHARD A. 1910. Catalogue of the Odonata of North America. Bull. Public Mus. Milwaukee, vol. 1, art. 1, pp. 1-207.

SELYS-LONGCHAMPS, Baron EDMOND DE (with H. A. Hagen). 1857. Monographie des Gomphines. Separate, pp. viii + 1-460, pls. 1-23. 1858, Mem. Soc. Sci. Liege, vol. 11, pp. 257-720.

WALKER, E. M. 1912. The North American dragonflies of the genus Aeshna. Univ. Toronto Studies, Biol. Ser. no. 11, pp. viii + 1-213, pls. 1-28.

ID. 1925. The North American dragonflies of the genus Somatochlora. Univ. Toronto Studies, Biol. Ser. no. 26, pp. 1-202, pls. 1-35.

A New Species of Coelus Eschscholtz. (Coleoptera: Tenebrionidae).

By FRANK E. BLAISDELL, SR., Stanford Medical School and Associate in Research, California Academy of Sciences, San Francisco, California.

Coelus gracilis new species.

Gracilis belongs to the Globosus Group [1] which also includes *globosus* Lec., *grossus* Csy. (*solidus* Csy., immature form) and *saginatus* Csy.; also the insular species *pacificus* and *remotus* of Fall. It is the smallest species of the group thus far discovered, some specimens scarcely exceeding in size the larger ones of *Coelomorpha* Csy. that occur in a similar habitat in the vicinity of Ensenada, Lower California, Mexico. All of the species belonging to the tribe Coelini burrow in sand dunes or sandy areas, under vegetation in littoral regions along the Pacific coast. Mainland species of the Globosus Group are known, from the data at hand, to occur only in the vicinity of Ensenada northward to Santa Cruz, California. It is interesting to discover a species as far north as Antioch, Contra Costa County, California; the author knows of no record of species belonging to the group under discussion occuring north of Santa Cruz.

[1] Blaisdell, Synopsis and review of the species of Coelus. Trans. Amer. Ent. Soc., XIV, p. 318, 1919.

Form oval to slightly oblong-ovate, small in size and about one-fifth longer than wide. Color nigro-piceous to ferruginous or paler due to immaturity; antennae and palpi flavo-testaceous, legs more or less piceous. Cilia along sides of body, long, dense, erect and fulvous, with bristling hairs of the same kind on the legs; hairs not occurring on the anterior pronotal margin and head behind the frontal suture, as in the species of the Ciliatus Group.

Head relatively moderate in size, twice as wide as length of an antenna; epistoma relatively large and more prominent laterally than the eyes, sides arcuately convergent anteriorly, angles broadly rounded, apical margin moderately deeply sinuate in middle two-fourths, sinus rather evenly arcuate, surface gradually arising from the frontal suture, somewhat convex and more or less impressed within the apical margin lateral to the sinus, rather closely punctate especially toward the sides, punctures moderate in size; frontal suture well marked, straight in middle three-fifths with lateral fifths arcuately attaining the eyes. Frons somewhat convex, broadly flattened in the central area, rather densely punctate, most so laterally and against the suture, punctures slightly larger and stronger than on the epistoma. Eyes coarsely facetted. Antennae in length equal to one-half the width of the epistoma, last four segments moderately compressed and somewhat gradually widened except the last; first segment not visible from above, second and third obconical, the former slightly larger than the latter, both a little longer than wide, fourth to the seventh inclusive slightly wider at apex and briefly constricted at base, as long as wide; last four segments forming a feebly defined club, the eighth triangular and as long as wide, ninth and tenth transverse the latter slightly wider, eleventh smaller, narrower and subquadrate.

Pronotum transverse, slightly more than twice as wide as long and twice as wide as the head; base less than one-half wider than apex, sinuation of the latter broad, moderately deep and rather straight in middle two-fourths, apical angles prominent and well rounded, margin beaded; sides broadly arcuate and moderately convergent anteriorly, margin beaded and continuously so with that of the apex; base transverse, margin thin and coriaceous, angles rather narrowly rounded; disk moderately convex from side to side, almost evenly punctate, punctures small, well defined and separated by a distance equal to about three to six times their diameter, larger and denser in the submarginal area, the latter not widely impressed, each

puncture with a moderately long and more or less semi-erect hair. Sides less than moderately explanate. Surface finely alutaceous.

Elytra more or less moderately inflated posteriorly, about one-fifth longer than wide and three times as long as the pronotum; sides subparallel and moderately arcuate, apex subogival; disk strongly convex from side to side, less so in basal one-third, strongly so and arcuately declivous apically, surface moderately closely punctate, punctures separated by a distance equal to two to four times their diameter, smaller and quite simple in the central area, becoming a little larger and feebly muricate laterally and apically; each puncture with a fine subrecumbent, short hair which becomes coarser at the periphery.

Measurements.—(Types) Male: length 5 mm.; width 3 mm. Female: length 7 mm.; width 4 mm.

Holotype, female, no. 4698, and *allotype,* male, no. 4699, in the collection of Dr. E. C. Van Dyke, Museum of the California Academy of Sciences; collected at Antioch, Contra Costa County, CALIFORNIA, April 24, 1938, by Dr. Van Dyke. Thirty-four *paratypes* with same data; two are to be placed in the collection of the American Entomological Society, Philadelphia. Largest specimen measures: Length 7 mm., width 4 mm.; smallest: length 4.5 mm., width 2.5 mm.

The author has figured the genitalia of *Coelus ciliatus* Esch.,[2] genotype of the genus.[3] Those of *gracilis* are of the same phylogenetic type, but show some specific differences. The aedeaga [4] of the female is testaceous in color and feebly chitinized, the lateral plates have a few very fine punctures, each with a long fine erect seta, none have been observed on the dorsal and ventral plates in the specimens examined.

Gracilis is to be recognized by its small size, smooth integument, fine and nearly simple punctation and with a facies somewhat like that of a small *Eusattus dubius* Lec.; the sides of the pronotum are but feebly explanate.

[2] Synopsis and review of the species of Coelus. Trans. Amer. Ent. Soc., xiv, p. 318, 1919, pl. xxxii.

[3] Eschscholtz, Zool. Atlas, Heft iii, p. 5, pl. 14, fig. i, 1829.

[4] In Transactions of the American Entomological Society 59, p. 223, I have proposed "that the term aedeaga be applied to the combination of sclerites in the female sexual segment."

A New Holopyga from the Western United States (Hymenoptera: Chrysididae).

By Wm. G. Bodenstein, Cornell University,
Ithaca, New York.

In a recent loan of Chrysididae from the United States National Museum there is a large series of the following new species of *Holopyga*.

Holopyga taylori*, new species.

Head: In anterior aspect transverse, oval; in dorsal aspect slightly wider and about as long as the pronotum. Vertex with shallow, well-spaced punctures becoming very fine and widely spaced on the occiput. Facial basin with a moderate vertical depression, polished, and with traces of transverse striations; punctured at the sides similarly to the vertex. Clypeus elevated between the antennae, with a few very fine punctures. Mandibles with three teeth. Antennae with the second joint of the flagellum slightly longer than the fourth.

Thorax: Prothorax punctured similarly to the occiput, the fine punctures interspersed with large, shallow, almost obsolete punctures; the punctuation not much heavier at the sides than on the disc. Mesothorax with very fine, well-separated punctures, becoming close and dense at the anterior ends of the parapsidal sutures; the punctures becoming sparser toward the posterior end of the segment. Mesopleurae with the punctuation indistinct and with traces of fine striations. Scutellum smooth and polished with some traces of obsolete punctures. Postscutellum reticulately punctured on the disc with a small, oblique, rectangular area on each side which is transversely striated. Propodeum reticulately punctured; oblique foveolae roughly triangular in shape with the broad base of the triangle at right angles to the lateral angles of the propodeum; about in the middle of the base of the triangle there is a low, blunt projection. Between the foveolae is a rugose, almost striate area below which there is a vertical ridge. Lateral angles of the propodeum short and acute. Tegulae dark brown, smooth and polished. Wings with the discoidal cells completely lacking; not infuscated. Claws with two inner teeth.

Abdomen: In dorsal aspect the abdomen is egg-shaped, about three-quarters as wide as long; all segments are of about equal length on the median line. First segment with fine

---

*I name this species for Dr. Leland H. Taylor whose notes and material on the Chrysididae have been of inestimable value to me.

punctures and fine transverse striations, impunctate in the center of the anterior border. Second and third segments punctured as the first, the punctures becoming a little closer together posteriorly. Third abdominal segment truncate at the apex, the truncate portion roughly about one-third the width of the segment at the base. Apical margin very thin, not membranous and not turned under.

Color: Blackish-bronze in color with blue and green reflections on sides of thorax and abdomen. Tibiae and tarsi light brown.

Female: The female differs from the male as follows: vertex and occiput evenly puctured with fine punctures, slightly larger than those of the male. Facial basin with the transverse striations more distinct. Thorax more evenly punctured; mesopleurae with more distinct punctures. Scutellum more distinctly punctured at the sides. Punctures of the propodeum continued evenly between the oblique foveolae. Abdomen not as heavily punctured, the transverse striations very faint. Face metallic blueish-green in color.

Length: 2-3.5 mm.

Type.— ♂ ; Hollister, Twin Falls County, IDAHO. August 7, 1930. (Plot 3a.) [United States National Museum.] *Allotype.*— ♀ . The same locality, August 21, 1930. (Outside.) [United States National Museum.]

Paratypes. — Seventeen males, twenty females, as follows: IDAHO: 4 ♂ ; 1 ♀ ; Hollister, Twin Falls County; June 13 to July 24, 1931; (D. E. Fox; on *Sophia sophia* and *Salsola pestifera*) ; 2 ♂ ; August 13, 1929; 5 ♀ ; August 7, 1930; 1 ♀ ; July 30, 1929; (F. B. Hinnenkamp; on *Salsola parviflora*). 2 ♂ ; Adelaide, July 25, 1928; (on *Sophia sophia*) ; and 1 ♂ ; September 14, 1929; on (*Salsola pestifera*) ; and 1 ♀ ; July 21, 1927; (on *Salsola filipes*). 2 ♀ ; Burley, June 16, 1931; also August 7, 1929; (on *Salsola pestifera,* at edge of cultivated area). 1 ♂ ; Castelford, June 28, 1928; (on *Sophia sophia*) ; and 1 ♀ ; August 25, 1927; (on *Atriplex rosea*). 1 ♀ ; Berger; September 5, 1930; (on *Salsola pestifera*). 1 ♂ ; Kimama; May 15, 1931; (F. B. Hinnenkamp; on *Norta altissima*). [All U. S. N. M.]

MISSOURI: 3 ♀ ; St. Louis; January 8, 1920; (Phil Rau; numbers 3812 and 3813) ; [U. S. N. M.]

CALIFORNIA: 1 ♀ San Diego County; April; (Coquillett) ;

[U. S. N. M.]. 6 ♂; 3 ♀; Emeryville, October 26 and November 3, 1938; (J. W. MacSwain).

This species may be easily distinguished from the previously described North American species of *Holopyga* by its small size, its reduced punctuation, the absence of the discoidal cells, the two teeth in the tarsal claw, and by the apical margin of the third abdominal segment which is very thin and not turned under. A further discussion of this and a related species will be made in a revisionary paper now in preparation.

A Treatment for Crumpled Wings of Odonata Nymphs to Disclose Their Venation.

By May K. Gyger, Ithaca, New York.

Dragonfly nymphs may often be determined to the genus by means of the venation in the wing pads. However, in the latter part of the ultimate nymphal instar the wings are much crumpled and their characters thereby obscured. In the course of some work on nymphs from the Philippine Islands a very peculiar and unique specimen with wing pads badly crumpled was found and Dr. Needham suggested to the author to see whether anything could be done to stretch the wings so that the venation could be seen. The following method is the outcome of much trial and error and, while probably not the best possible, does give usable results.

To prepare an anisopterous wing pad for study, clip it from the nymph and remove the outer layer by cutting along its entire hind margin with a razor blade, then tease the wing out with a dissecting needle. Immerse the wing in boiling water for about three minutes and next place it in twenty drops of a one percent solution of potassium hydroxide. The membrane will begin to expand in a few seconds. Leave it in this solution until it has ceased swelling. Remove, place in boiling water again and float therefrom onto an ordinary glass slide. If the specimen has been in alcohol for a long time further treatment is necessary. Holding the slide in both hands with the fingers underneath and the thumbs on top, gently pull and

stretch the entire wing in all directions with the edges of the balls of the thumbs. Continue to do this until the wing dries. It will adhere to the slide and should be nearly the size of the adult wing. Now it may be made into a dry mount or mounted in balsam or, if desired, may be replaced in the vial of alcohol with the nymph from which it came. To study the wing at any later time after it has been in alcohol, it may need to be placed in boiling water for one or two minutes, placed on a slide and stretched again as described above. A dry mount usually seems the most satisfactory means of permanent preservation.

A zygopterous wing pad requires somewhat simpler but more delicate treatment. After removing the nymphal skin place the wing in a hot one-half of one percent solution of potassium hydroxide. Let it remain there until it has ceased to expand and remove immediately to hot water and thence to a slide where it can be teased out with needles.

Anyone who wishes to identify rare specimens is strongly advised to practice first with some common forms since both speed at the right moments and very gentle handling are necessary to avoid ruining the preparation.

Acknowledgment and thanks are due to Dr. Julio García-Díaz, of the University of Puerto Rico, who really did most of the work on the method for Zygoptera nymphs.

Apis griseocollis DeGeer—Bombus separatus Cresson. (Hymenoptera: Bombidae.)

In connection with my work on bumblebees, several years ago I ran across a note by W. A. Schulz (*Berlin. Entom. Zeitschr.* 57: 59, 1912) which stated that the type of *Apis griseocollis* DeGeer was still in the Museum in Stockholm and was a bumblebee.

H. J. Franklin in his Monograph "The Bombidae of the New World" (*Trans. Am. Ent. Soc.* XXXVIII, 1912) I, p. 177, puts the name given by DeGeer, with a question-mark, as synonym of *Bombus impatiens* Cresson. The characters given by Schulz eliminate this possibility, but they are in several respects not complete enough to indicate clearly the species

involved. There is, for example, no mention of the position of ocelli. Schulz himself was unable to determine the species concerned from Handlirsch's paper ("Die Hummelsammlung des k. k. Naturhistorischen Hofmuseums" in *Ann. K. K. Naturh. Hofmus.* III, Wien 1888).

To clear up finally this uncertainty, I shipped a determined lot of bumblebees to Stockholm and asked Professor Sjöstedt for his kind help. At his request Dr. A. Roman of the Museum compared the type with the material sent by me and informed me as follows:

The type of "*Apis griseocollis* DeGeer" is a worker of the species known to us now as *Bombus separatus* Cresson.

This conclusion, Dr. Roman informed me, he had reached years ago, and was able now to corroborate it from the material shipped by me.

I rather reluctantly publish this note as I am not fond of nomenclatorial changes. As the type is still in existence and the case is a clear one I see, unfortunately, no way to avoid the application of our existing nomenclatorial rules.

By P. Peter Babiy, Cornell University, Ithaca, New York.

A Substitute Name for Patera Schwarz (Hymenoptera: Meliponidae).

Recently in a paper on the stingless bees of British Guiana, I proposed the name *Patera* (Bull. Amer. Mus. Nat. Hist., LXXIV, p. 475, [1938]) for a subgenus of the Meliponid genus *Trigona*. Dr. V. S. L. Pate has brought to my attention that this name has unfortunately been used twice previously,—first in 1837 by R. P. Lesson (Prod. Medus., P. 34) for a Coelenterate, and later in 1850 by J. C. Albers (Die Heliceen, p. 97) for a subgenus of the land snail *Helix*. Therefore, to replace my preoccupied *Patera*, I adopt his suggestion that the name *Partamona* be adopted, with the same genotypic species, i. e. *Melipona testacea* Klug, 1807 [=*Trigona* (*Partamona*) *testacea* (Klug)]. The name *Partamona* is taken from a tribe of Indians of Arawak stock inhabiting the hinterland of British Guiana.—Herbert F. Schwarz, American Museum of Natural History, New York.

A New Species of Aphodius from New Jersey (Coleoptera: Scarabaeidae).

By Mark Robinson, 1533 So. 56th Street,
Philadelphia, Pennsylvania.

Aphodius odocoilis, n. sp.

1930. *Aphodius crassulus* Sim (not Horn, 1870), Journ. N. Y. Ent. Soc., XXXVIII, p. 142.

This is the species mentioned by Sim as being *crassulus* Horn but the concave elytral intervals will serve to distinguish this species from *crassulus* and allied species.

Robust, very convex, sides parallel, piceous, shining.

Head tuberculato-rugose in front, punctate posteriorly with barely a trace of tubercules. Clypeus emarginate with distinct denticles on each side.

Prothorax slightly wider than long, sides parallel, with the hind angles obtusely rounded, basal marginal line distinct. Rather sparsely punctured at the middle the punctures becoming denser laterally, the punctures are moderately deep with a few finer punctures intermixed.

Elytra parallel. Striae sparsely, crenately, punctured. Intervals distictly concave at base gradually flattening towards apex, finely and sparsely punctured. Humeri denticulate.

Anterior tibiae smooth in front, finely crenulate above the third tooth. First joint of hind tarsi equal to next three.

Length, 2.7 to 3.7 mm.; Breadth, 1.4 to 2.0 mm.

Type. — Mt. Misery, New Jersey, March 22, 1937 (Mark Robinson). In author's collection.

Paratypes. — 30, Mt. Misery, N. J., various dates between March 22, 1937 and June 6, 1938 (Mark Robinson). Mt. Misery, N. J., March 27, 1938 (L. J. Bottimer). Mt. Misery, N. J., May 30, 1938 (L. W. Saylor). Ballingers Mill, N. J., June 3 and 11, 1929 (R. J. Sim) Sim and Wenzel.

Paratypes have been deposited in the collection of the following: Academy of Natural Sciences of Philadelphia, Museum of Comparative Zoology, U. S. National Museum, American Museum of Natural History, H. C. Fall, C. A. Frost, L. W. Saylor, R. C. Casselberryi, O. L. Cartwright and L. J. Bottimer.

This species has been taken only in deer and rabbit excrement.

List of Titles of Publications Referred to by Numbers in Entomological Literature in Entomological News.

1. Transactions of The American Entomological Society. Philadelphia.
2. Entomologische Blätter, red. v. H. Eckstein etc. Berlin.
3. Annales Sci. Naturelles, Zoologie, Paris.
4. Canadian Entomologist. London, Canada.
5. Pysche, A Journal of Entomology. Boston, Mass.
6. Journal of the New York Entomological Society. New York.
7. Annals of the Entomological Society of America. Columbus, Ohio.
8. Entomologists' Monthly Magazine. London.
9. The Entomologist. London.
10. Proceedings of the Ent. Soc. of Washington. Washington, D. C.
11. Deutsche entomologische Zeitschrift. Berlin.
12. Journal of Economic Entomology, Geneva, N. Y.
13. Journal of Entomology and Zoology. Claremont, Cal.
14. Archivos do Instituto Biologico, Sao Paulo.
15. Annales Academia Brasileira de Sciencias. Rio de Janeiro.
17. Entomologische Rundschau. Stuttgart, Germany.
18. Entomologische Zeitschrift. Frankfurt-M.
19. Bulletin of the Brooklyn Entomological Society. Brooklyn, N. Y.
20. Societas entomologica. Stuttgart, Germany.
21. The Entomologists' Record and Journal of Variation. London.
22. Bulletin of Entomological Research. London.
23. Bollettino del Lab. di Zool. gen. e agraria della Portici. Italy.
24. Annales de la société entomologique de France. Paris.
25. Bulletin de la société entomologique de France. Paris.
27. Bolletino della Societa Entomologica Italiana. Genova.
28. Ent. Tidskrift utgifen af Ent. Föreningen i Stockholm. Sweden.
29. Annual Report of the Ent. Society of Ontario. Toronto, Canada.
30. Archivos do Instituto de Biologia Vegetal, R. d. Janeiro.
31. Nature. London.
32. Boletim do Museu Nacional do Rio de Janiero. Brazil.
33. Bull. et Annales de la Société entomologique de Belgique. Bruxelles.
34. Zoologischer Anzeiger, hrsg. v. E. Korschelt. Leipzig.
35. The Annals of Applied Biology. Cambridge, England.
36. Trans. Royal Entomological Society, London. England.
37. Proceedings of the Hawaiian Entomological Society. Honolulu.
38. Bull. of the Southern California Academy of Sciences. Los Angeles.
39. The Florida Entomologist. Gainesville, Fla.
40. American Museum Novitates. New York.
41. Mitteilungen der schweiz. ent. Gesellschaft. Schaffhausen, Switzerland.
42. The Journal of Experimental Zoology. Philadelphia.
43. Ohio Journal of Sciences. Columbus, Ohio.
44. Revista chileña de historia natural. Valparaiso, Chile.
45. Zeitschrift für wissenschaftliche Insektenbiologie. Berlin.
46. Zeitschrift für Morphologie und Ökologie der Tiere. Berlin.
47. Journal of Agricultural Research. Washington, D. C.
49. Entomologische Mitteilungen. Berlin.
50. Proceedings of the U. S. National Museum. Washington, D. C.
51. Notulae entomologicae, ed. Soc. ent. Helsingfors. Helsingfors, Finland.
52. Archiv für Naturgeschichte, hrsg. v. E. Strand. Berlin.
53. Quarterly Journal of Microscopical Science. London.
54. Annales de Parasitologie Humaine et Compareé. Paris.
55. Pan-Pacific Entomologist. San Francisco, Cal.

56. "Konowia". Zeit. für systematische Insektenkunde. Wien, Austria.
57. La Feuille des Naturalistes. Paris.
58. Entomologische Berichten. Nederlandsche ent. Ver. Amsterdam.
59. Encyclopédie entomologique, ed. P. Lechevalier. Paris.
60. Stettiner entomologische Zeitung. Stettin, Germany.
61. Proceedings of the California Academy of Sciences. San Francisco.
62. Bulletin of the American Museum of Natural History. New York.
63. Deutsche entomologische Zeitschrift "Iris". Dresden.
64. Zeitschrift des österr. entomologen-Vereines. Wien.
65. Zeitschrift für angewandte Entomologie, hrsg. K. Escherich. Berlin.
66. Report of the Proceedings of the Entomological Meeting. Pusa, India.
67. University of California Publications, Entomology. Berkeley, Cal.
68. Science. New York.
69. Physis. Revista Soc. Argentina Cien. Nat. Buenos Aires.
70. Entomologica Americana, Brooklyn Entomological Society. Brooklyn.
71. Novitates Zoologicae. Tring, England.
72. Revue russe d'Entomologie. Leningrad, USSR.
73. Mem. Instituto Butantan. Sao Paulo, Brazil.
74. Sbornik entomolog. národniho musea v Praze. Prague, Czechoslovakia.
75. Annals and Magazine of Natural History. London.
77. Comptes rendus heb. des séances et mémo. de la soc. de biologie. Paris.
78. Bulletin Biologique de la France et de la Belgique. Paris.
79. Koleopterologische Rundschau. Wien.
80. Lepidopterologische Rundschau, hrsg. Adolf Hoffmann. Wien.
82. Bulletin, Division of the Natural History Survey. Urbana, Illinois.
83. Arkiv för zoologie, K. Svenska Vetenskapsakademien i. Stockholm.
84. Ecology. Brooklyn.
85. Genetics. Princeton, New Jersey.
87. Archiv für Entwicklungs mechanik der Organ., hrsg. v. Roux. Leipzig.
88. Die Naturwissenschaften, hrsg. A. Berliner. Berlin.
89. Zoologische Jahrbücher, hrsg. v. Spengel. Jena, Germany.
90. The American Naturalist. Garrison-on-Hudson, New York.
91. Journal of the Washington Academy of Sciences. Washington, D. C.
92. Biological Bulletin. Wood's Hole, Massachusetts.
93. Proceedings of the Zoological Society of London. England.
94. Zeitschrift für wissenschaftliche Zoologie. Leipzig.
95. Proceedings of the Biological Soc. of Washington, Washington, D. C.
97. Biologisches Zentralblatt. Leipzig.
98. Le Naturaliste Canadien. Cap Rouge, Chicoutimi, Quebec.
99. Mélanges exotico-entomologiques, Par Maurice Pic. Moulins, France.
100. Bulletin Intern., Acad. Polonaise Sci. et Lett. Cracovie.
101. Tijdschrift voor entomologie. Nederland. Ent. Ver., Amsterdam.
102. Entomologiske Meddelelser, Entomologisk Forening, Copenhagen.
103. Journal of the Kansas Entomological Society, Lawrence, Kansas
104. Revista de la Sociedad entomologica Argentina, Buenos Aires.
105. Revista Entomologia, Sao Paulo, Brazil.
106. Anales Sociedad Cientifica Argentina, Buenos Aires.
107. Proc., Royal Entomological Society, London.
108. Revista, Col. Nac. Vicente Rocafuerte, Guayaquil.
109. Arbeiten uber morpholog. und taxonom. ent. aus Berlin-Dahlem.
110. Arbeiten ueber physiolog. u. angewandte ent. aus Berlin-Dahlem.
111. Memorias do Instituto Oswaldo Cruz. Rio de Janeiro.
112. Anales del Instituto de Biologia Mexico.
113. Entomologische Beihefte aus Berlin Dahlem.
114. Occasional Papers of the Museum of Zoology, University of Michigan.
115. Memorias de la Soc. Cubana de Hist. Nat. Havana, Cuba.
116. Parasitology. Ed. Keilin and Hindle. London.

Current Entomological Literature

COMPILED BY V. S. L. PATE, LAURA S. MACKEY and E. T. CRESSON, Jr.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( ) follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—**Anduze, P.**—Viaje por el Oriente de Venezuela. [Bol. Soc. Venezolana Cien. Nat.] 4: 282-307, ill. **Cresson, E. T.**—Centenary, by S. R. Raganathan. [Current Sci., Calcutta] 6: 929-930. **Darlington, P. J.**—Was there an Archatlantis? [90] 72: 521-533, ill. **Eddy, B.**—Insect zoo as a wildlife conservation project. [68] 88: 215-216. **Jones, Weber & Dowden.**—Effectiveness of imported insect enemies of the satin moth. [U. S. D. A. Circ.] no. 459; 24 pp., ill. **Martin, C. H.**—Effect of sunlight and of location of logs on the beetle infestations of elm logs. [19] 33: 195-203, ill. **Phelps, W. H.**—La expedicion del American Museum of Natural History at Monte Auyantepuy. [Bol. Soc. Venezolana Cienc. Nat.] 4: 251-265, ill. **Portevin, G.**—Ce Qu'il Faut Savoir des Insectes. 188 pp., ill. Lechevalier, Paris. **Rothschild, Lord.**—In memory of, by K. Jordan. [71] 41: 1-41, ill. **Uvarov, B. P.**—Fourth International Locust Conference. [31] 142: 174-175.

ANATOMY, PHYSIOLOGY, ETC.—**Anonymous.**—Female wasp fixes sex of hatch from her eggs. [J. Tenn. Acad. Sci.] 13: 247. **Carpenter & Eltringham.**—Audible emission of defensive froth by insects; with an appendix on the anatomical structures concerned in a moth. [93] 108A: 243-252, ill. **Chauvin, B.**—Morphologie et pigmentation externes de Schistocerca gregaria (transiens dissocians). [Bull. Soc. Hist. Nat. Afr. Nord.] 29: 249-267, ill.

Eggers & Gohrbanat.—Hypogymna morio—ein Sonderfall—in der Desetzmassigkeit phyletischer Korrelationen? [89] Abt. Syst. 71: 264-276, ill. **Grandjean, F.**—Remarques sur la terminologie des divisions du corps chez les Acariens. [Bull. Mus. Nat. Hist. Nat., Paris] 9: 373-378. **Grasse & Lesperon.**—Notes histologiques et biologiques sur un larve de Coleoptere Termitophile, Troctonotus silvestrii, n. sp. [Arch. Zool. Exp. Gen., Paris] 79: 463-486, ill. **Hadorn, E.**—Die degeneration der Imaginalscheiben bei letalen Drosophila-larven der Mutation "lethal-giant." [Rev. Suisse Zool.] 45: 425-429, ill. **Hennig, W.**—Beitrage zur Kenntnis der Kopulationsapparates und der Systematik der Acalyptraten. [109] 5: 201-213, ill. **Hurlbut, H. S.**—A study of the larval chaetotaxy of Anopheles walkeri (Culicidae). [Amer. J. Hygiene] 28: 149-173, ill. **von Lengerken, H.**—Beziehungen zwischen der Ernahrungsweise und der gestaltung der mandibeln bei den larven der Silphini (Coleo.). [34] 122: 171-175, ill. **Lison, L.**—Le systeme malpighiens de Araeocerus fasciculatus (Coleo: Phytophaga). [Ann. Soc. R. Zool. Belg.] 68: 103-120, ill. **Lutz, F. E.**—The insect glee club at the microphone. [Natural History] 42: 338-345, ill. **Mahler, H.** — Histologische untersuchungen uber die spinndrusen einiger spinnen. [46] 34: 439-498, ill. **Orosi-Pal, F.**—Studien uber die Bienenlaus (Braula caeca, Dipt.). [Zeitschr. Parasitenk.] 10: 221-238, ill. **Paulian, R.**—Contribution a l'etude quantitative de la regeneration chez les Arthropodes. [93] 108A: 297-383, ill. **Rait, W. L.** — A study of the growth of the fore wing-sheaths in Eusthenia spectabilis (Plecop.) [Trans. & Proc. R. Soc. So. Australia] 61: 63-73. Further remarks on terminology relation to the growth of the fore wing-sheath in the larva of Eusthenia spectabilis (Plecop.). [Trans. & Proc. R. Soc. So. Australia] 61: 158. **Rivnay, E.**—Moisture as the factor affecting wing development in the citrus aphis, Toxoptera aurantii. [22] 28: 173-179. **Rosenthal, H.** — Azione delle temperature elevate sui vari stadi di sviluppo di Dermestes vulpinus (Coleo.). [Boll. Zool.] 9: 37-39. **Sen, P.**—On the biology and morphology of Rhabdophaga saliciperda (Dipt: Cecidomyid.), a common pest of willows. [89] Abt. Anat. 65: 1-36, ill. On the structure (anatomical and histological) of the full grown larva of Rhabdophaga saliciperda (Dipt: Cecidomyid.). [89] Abt. Anat. 65: 37-62, ill. **Smreczynski, S.** — Entwicklungsmechanische Untersuchungen am Ei des Kafers Agelastica alni. [89] Abt. All. Zool.

59: 1-59, ill. **Subkleir, W.**—Zur morphologie der larven von Melolontha hippocostani (Scarab.). [52] 7: 270-304, ill. **Tazelaar, M.**—Some studies on regeneration and relative growth of limbs in mayfly larvae. [93] 108A: 257-265, ill. **Thomsen, E.**—Uber den Kreislauf im flugel der Musciden mit besonderer berucksichtigung der akzessorischen pulsierenden organe. [46] 34: 416-438, ill. **Tischler, W.**—Zur Okologie der wichtigsten in Deutschland an Getreide schadlichen Pentatomiden. [46] 34: 317-366, ill. **Wigglesworth, V. B.**—"Climbing organs" in insects. [31] 141: 974-975.

ARACHNIDA AND MYRIOPODA. — **Berland, L.** —Les Araignees. [Livr. Nat. no. 43] xii + 173 pp., Delamair et Bontelleau, Paris. **Bristow, W. S.**—The classification of Spiders. [93] 108B: 285-321, ill. (k). **Everly, R. T.**—See under Coleoptera. **Grandjean, F.**—Observations sur les Acariens. [Bull. Mus. Nat. Hist. Nat., Paris] 10: 64-71, ill. **Jacot, A. P.**—Four new Arthropods from New England. [Amer. Midl. Nat.] 20: 571-574, ill. **Kaston, B. J.**—New spiders from New England with notes on other spp. [19] 33: 173-191, ill. North American spiders of the gen. Agroeca. [Amer. Midl. Nat.] 20: 571-74, ill. (k*). **de Toledo Piza, S.**—Novas especies de Aranhas myrmecomorphas do Brasil e consideracoes sobre o seu mimetismo. [Rev. Mus. Paulista] 23: 309-319, ill.

THE SMALLER ORDERS OF INSECTS.—**Carpenter, F. M.**—Two Carboniferous insects from the vicinity of Mazon Creek, Illinois (Palaeodictyoptera and Protorthoptera). [Amer. J. Sci.] 36: 445-452, ill., (*). **Clay, T.**—A revision of the genn. and spp. of Mallophaga occurring on Gallinaceous birds. Pt. I.—Lipeurus and related genn. [93] 108B: 109-204, ill., (k*). **Clay & Rothschild.**—Ectoparasites from captive birds. [71] 41: 61-73. **Gloyd, L. K.** —A n. sp. of the gen. Libellula from Yucatan. [114] no. 337: 1-4, ill. **Guimares & Lane.**—Contribucoes para o conhecimento das Mallophagas das aves do Brasil. VI.—Novas especies parasitas de Tinamiformes. [Rev. Mus. Paulista] 23: 1-22, ill. **von Hagen, W.**—Contribution to the biology of Nasutitermes (s. S.) (Isoptera). [93] 108A: 39-49, ill., (S). **Jacot, A. P.**—See under Arachnida. **Keler, S.**—Baustoffe zu einer monographie der Mallophagen. 1.—Ueberfam. Trichodectoidea. [N. Act. Leopoldina] 5: 395-

467, ill. Ueber einige Mallophagen aus Paraguay und Kamerun. [109] 5: 228-241, ill., (*). **Krey, J.** — Untersuchungen zur Okologie der Trichopterenlarven unter besonderer Berucksichtigung der Moorbewohner Schleswig-Holsteins. [Schrift. Naturwissensch. Ver. S. H.] 22:271-318. **Thompson, G. B.**—The Lice of Petrels. Pt. 1.—The elongate forms. [75] 2: 481-493. On two spp. of Mallophaga from Phaethon rubrocauda roseotincta. [75] 2: 459-465, ill., (S).

ORTHOPTERA.—**Chopard, L.**—La Biologie des Orthopteres. [Encyl. Ent.] Ser. A, 20; 541 pp., ill., Lechevalier, Paris. **Harvey, L. A.**—Preliminary note on the relations between grasshoppers and the re-colonisation of denuded heath and moor-land vegetation. [Trans. Soc. Brit. Ent.] 5: 291-297, ill.

HEMIPTERA.—**Beamer, R. H.**—Two n. spp. of Allygianus (Cicadellidae). [55] 14: 153-155, ill. **Caldwell, J. S.** —The Jumping Plant lice of Ohio (Chermidae). [Ohio Biol. Surv. Bull. 34] 6: 228-282, ill. (k*). **DeLong, D. M.**—Three n. spp. of Texananus (Cicadellid.). [55] 14: 185-186. **Drake & Harris.**—A new Rhagovelia from Cuba. [55] 14: 152. **Hungerford, H. B.**—A n. sp. of Neocorixa (Corixidae). [19] 33: 170-172, ill. **Lepage, H. S.** — Catalogo dos Coccideos do Brasil. [Rev. Mus. Paulista] 23: 327-491. **Osborn, H.**—The Fulgoridae of Ohio. [Ohio Biol. Surv., Bull. 35] 6: 283-349, ill., (k). **Pratt, R. Y.** — Observations on the striding habits of the Gerridae. [55] 14: 156. **de la Torre-Bueno, J. R.**—Stenomacra marginella H.-Sch. and S. cliens Stal, a taxonomic note and a correction (Pyrrhocor.). [19] 33: 192-193, (k).

LEPIDOPTERA.—**Brubaker, L. H.**—The life of the mourning cloak [Nature Mag.] 31: 354-357. **Kohler, P.**—Neotropischer Psychiden aus dem Deutschen Entomologischen Institut. [109] 5: 246-248, ill., (*). **Lichy, R.** — Lepidopteros nuevos para Venezuela. [Bol. Soc. Venezolana Cien. Nat.] 4: 266-278, ill. (*). **Mendes, D.**—Nota sobre Maruca testulalis (Pyralid.). [Rodriguesia] 3: 167-169, ill. **Schaus, W.**—N. spp. of American Heterocera in the U. S. National Museum. [75] 2: 504-517, (S). **Travassos, L.**—Sobre um novo typo de Syssphingidae. [Rodriguesia] 3: 199-201, ill.

DIPTERA.—Alexander, C. P.—New or little known Tipulidae: Neotropical Species. [75] 2: 416-438. **Antunes & Lane.**—Um novo Aedes, Aedes (Ochlerotatus) pennai, encontrado em Sao Paulo. [Rev. Mus. Paulista] 23: 605-614, ill. **Ayrosa Galvao & Lane.**—Notas sobre os Nyssorhynchus de Sao Paulo (Culicidae). [Rev. Mus. Paulista] 23: 23-28, ill. **Beckman, H.**—A simple feeding device for Culex pipiens in avian malaria studies. [68] 88: 114, ill. **Guimares, L. R.**—Sobre as especies sul Americanas do genero Trichobius (Streblidae). [Rev. Mus. Paulista] 23: 651-666, ill., (k). **Hall, D. G.**—N. genn. and spp. of South American Sarcophagidae. [109] 5: 253-259, ill. **Hennig, W.**—See under Anatomy. **Hurlbut, H. S.**—See under Anatomy. **James, M. T.**—A second species of Scoliopelta (Stratiomy.). [55] 156-157. **Lane & Antunes.**—Notas sobre o genero Mansonia subgen. Rhynchotaenia, com descripcao de uma nova especie (Culic.). [Rev. Mus. Paulista] 23: 225-232. **Lane & Ayrosa Galvao.**—Sobre a posicao systematica de Anopheles gilesi Neiva, 1908 (Culic.). [Rev. Mus. Paulista] 23: 29-34, ill. **Seguy, E.**—Fam. Muscidae. [Gen. Insect.] Fasc. 205; 604 pp., ill., (k). **Steyskal, G.**—The precopulatory behaviour of the male of Dolichopus omnivagus (Dolichopodid). [19] 33: 193-194.

COLEOPTERA.—Bierig, A.—Un Trogatus nuevo de Panama (Staphyl.). [115] 12: 243-244, ill. **Blaisdell, F. E.**—A n. sp. of Listus from the Sequoia National Park, California (Melyr.). [55] 14: 165-167. **Borchmann, F.**—Fam. Lagriidae. [Gen. Insect.] Fasc. 204; 561 pp., ill., (k). **Cazier, M. A.**—A new California Polyphylla with notes concerning the variability of certain characters within the genus. [55] 14: 161-164. **Darlington, P. J.**—The American Patrobini (Carabidae). [70] 18: 135-183, ill., (k*). **Everly, R. T.**—Spiders and insects found associated with sweet corn with notes on the food habits of some spp. I.—Arachnida and Coleoptera. [43] 38: 136-148, ill. **Hatch, M. H.**—Report on the Coleoptera collected by Dr. Victor B. Scheffer on the Aleutian Islands in 1937. [55] 14: 145-149. **Hatch & Beer.**—A n. sp. of Dicerca (Buprestidae) from Washington. [55] 14: 151. **Hustache, A.**—Curculionides nouveaux de l'Amerique meridionale, qui se trouvent dans le Deutsches Entomologisches Institut. [109] 5: 265-288. **Kleine, R.**—Neue Brenthiden aus dem Deutschen Entomologischen Institut. [109] 5: 289-291, ill. **Korschefsky, R.**—Eine neue Cycloneda-Art aus Brasilien. [109] 5: 264, ill.

Lane, F.—Notas sobre Lamiides Neotropicos e descripcao de especies novas. [Rev. Mus. Paulista] 23: 631-642, ill. Esboco monographico dos Anoplodermideos. [Rev. Mus. Paulista] 23: 153-224, ill. **Lane & Jesus Moure.**—Os Cholineos do Museu Paulista. I.—Descripcao de algunas especies novas. [Rev. Mus. Paulista] 23: 612-630, ill. **Lane & Pessoa.**—Sobre a validade especifica do Canthon dives Harold, 1868 (Scarab.). [Rev. Mus. Paulista] 23: 643-649, ill. **von Lengerken, H.**—See under Anatomy. **Linsley, E. G.**—Longevity in the Cerambycidae. [55] 14: 177. **McCauley, R. H.**—A revision of the genus Microrhopala in North America, north of Mexico (Chrysomel.). [19] 33: 145-169, ill., (k). **Maulik, S.**—On the structure of larvae of Hispine beetles. [93] 108B; 49-71, ill., (k). **Pessoa & Lane.**—Notas sobre o genero Phanaeus (Scarab.) com a descripcao de uma nova especie. [Rev. Mus. Paulista] 23: 323-326, ill. **Pratt, R. Y.**—One hour's collecting of Scaphinotus on Whidby. [55] 14: 167. **Schedl, K. E.**—Die Einteilung der Pityophthorinae (Rhynchophora). [52] 7: 157-188, ill., (Sk*). **Van Dyke, E. C.**—Calendra (Sphenophorus) minimus Hart in Calif. [55] 14: 187.

HYMENOPTERA.—Cockerell, T. D. A.—A new Bembecine wasp from San Nicolas Isl., California. [55] 14: 150. **Mickel, C. E.**—Photopsoid Mutillids collected by Dr. K. A. Salman at Eagle Lake, Calif. [55] 14: 178-185. **Mitchell, T. B.**—Notes on the Megachilid subgenera Xeromegachile and Derotropis. [55] 14: 168-177, ill. **Weyrauch, W.**—Recherches sur la chaleur dans le nids d'Hymenopteres sociaux. [Mem. Soc. R. Sci. Liege] 2: 307-394.

Occurrence of Aphodius scrofa Fabricius in Western Maine (Coleop.: Scarabaeidae).

Two specimens of this species were given me by Mr. W. J. Brown, Dominion of Canada Entomologist, which were taken by him at Aldouane, New Brunswick, July 6, 1928. The western march is indicated by the capture of five specimens at Weld, Maine, on July 2, 1938, in a single cow dropping. None of the other droppings in the pasture contained specimens and two days later there were none present in the dropping where the five were found.

Weld is situated about 25 miles south east of the Rangeley Lakes in the western part of the state.

C. A. Frost, Framingham, Massachusetts.

Entomological News for December, 1938, was mailed at the Philadelphia Post Office, January 11th, 1939.

ENTOMOLOGICAL NEWS

VOL. L. FEBRUARY, 1939 No. 2

When is a Name a Subspecific Name?

The Editor, ENTOMOLOGICAL NEWS:
Sir,

I have read with some interest and considerable dismay an article by William Hovanitz on "The Interpretation of the term subspecies, etc., etc.," which appeared in your February, 1938, issue. This article is of value in calling attention to the anomalous position in which entomological names of a category lower than subspecies now find themselves, inasmuch as they are not covered by the International Rules of Nomenclature. Lepidopterists are concerned more than other entomologists with names of this kind, and, writing as one of them, I agree with Mr. Hovanitz that the practice of lepidopterists is not as consistent as it should be, and undoubtedly calls for action; I cannot, however, believe that the action he appears to envisage will do anything to remedy this state of affairs.

The authors of the Rules cannot have been unaware of these other categories of names; they do not deny their existence, they merely ignore it (Article 2). To deduce from the premises set forth by Mr. Hovanitz that "it follows that the subspecies *is* the only category of lower rank than the species" is surely quite unwarranted; he is confusing taxonomy with nomenclature. One may, however, deduce from these same premises certain other things, namely (1) that the correct way of writing a subspecific name is the trinomial, and conversely that (in the absence of information to the contrary) any trinomial must be assumed to have reference to a subspecies; (2) that the rules do not apply to other categories of names and that in our treatment of these names, therefore, we are not governed by the Rules; (3) that these names in categories lower than the subspecies, having no status in scientific nomenclature, cannot take precedence over names recognized as valid

under the rules.

One may illustrate these points by making use of Mr. Hovanitz's own examples.

1. *Eurymus alexandra edwardsi* form *hatui* B. & B. is not quadrinomial (on Mr. Hovanitz's own reasoning such a thing could not exist, there being only uni-, bi- and tri-nomials in nomenclature), it is a valid trinomial to which is added a name that the authors, by calling it a form-name, have carefully excluded from the operation of the rules; *hatui* may not be a scientific name controlled by the rules, but one cannot deny that it is a name.

2. *Euphydras editha*. Neither "ab. *fieldi*" nor "r. *wrighti*" has any status in nomenclature, not being set forth as a trinomial or as a subspecific name by its author. Neither is a valid subspecific name until published as a trinomial, and whichever is published first in that form is the name of the subspecies, provided that no valid subspecific name has been published in the interval.

3. *interligata* Cabeau. As Mr. Hovanitz has been unable to refer to the original descriptions of the names which he discusses in this paragraph, I quote below the exact form in which each name was published:

(Rev. Men. Soc. Ent. Namuroise, 1919 : 49)

1. *Argynnis selene* Schiffermiller ab. *interligata,* n. ab.
2. *Argynnis euphrosyne* Linné ab. *interligata,* n. ab.
3. *Argynnis lathonia* Linné ab. *interligata,* n. ab.

(loc. cit., 1922 : 18)

4. *Argynnis dia* Linné ab. *interligata* n. ab.

(loc. cit., 1922 : 46)

5. *Argynnis pales* Schiffermiller forme *arsilache* Esper ab. *interligata,* n. ab.
6. *Argynnis ino* Rottemburg ab. *interligata,* n. ab.

If I understand Mr. Hovanitz correctly, he would have us believe that all these names (except No. 5 presumably) are trinomials. But a trinomial is written, thus: *Alpha beta gamma,* not *Alpha beta* ab. *gamma;* and the author here has obviously

taken considerable pains to make it clear that he is describing aberrations, and therefore, presumably, not subspecies. Mr. Hovanitz, however, in spite of this would appear to suggest that, whatever the author intended to do, he had in fact described, willy nilly, six homonymous subspecies* in the genus *Argynnis;* which, as Euclid used to say, is absurd.

4. Although the statement of fact given in this paragraph does not contain the whole truth, as the author himself suggests, that is immaterial to the argument. There are several species known to me of which the first name valid under the code was based upon a specimen which proved subsequently to be very atypical of the species, or, in other words an aberration. Does this present any difficulty? Take the (hypothetical) case quoted by Mr. Hovanitz. Is there any objection to referring to the aberration of *Argynnis niobe* as *A. niobe* ab. *adippe? Niobe* and *adippe* at the time of publication were equally valid *names, whatever their taxonomic values* may have been.

5. Precisely the same misunderstanding of the Rules leads Mr. Hovanitz again to an untenable position in this paragraph; but there is at least a clue to the nature of his misunderstanding. He uses the phrase "*Erebia ligea* ab. *subcaeca* Schultz; a trinomial." That seems to crystallise the difficulty. I maintain, and I believe that ninety nine lepidopterists out of a hundred would agree with me, that that is not a trinomial. A subspecific name is a trinomial name; does it follow that every use of three terms in conjunction must, whatever form it takes, be a subspecific name, even though its author explains that it is not?

Nomenclature is a sufficiently vexed and vexing a subject as it is, without the dragging of such red herrings as this across its turtuous path. Let Mr. Hovanitz apply to the Commission for a definition of a "trinomial" if he thinks it worth while: we would prefer to give our time to more productive labours.

Yours very truly,

N. D. Riley.

* Since the Code lays it down (Art. II) that specific and subspecific names are co-ordinate, the third term in a trinomial must not occur more than once in any one genus.

An Annotated List of The Butterflies of Nebraska (Lepid.: Rhopalocera).

By R. A. LEUSSLER, Omaha, Nebraska.

(Continued from Vol. xlix, page 280.)

134. H. COMMA (L.) race COLORADO (Scud.). Flies on the higher plains of the western part of the state with the preceding species and is equally common. Specimens are rather bright yellow fulvous and match up with the low altitude found in Colorado.

135. H. PAHASKA Leussler. Sioux County near Harrison, Nebraska; see Ent. News xlix, p. 5, 1938.

136. H. ATTALUS (Edw.). Rare. 1 female, Omaha, June 21, 1913; 2 females, 1 male, Omaha, June 17, 1922.

137. H. OTTOE (Edw.). The typical form is found only occasionally, and as *ogallala,* a darker, more heavily marked form is the prevalent one in the eastern as well as in the western part of the state, it is my opinion that the latter is the normal form of the first brood of this species, and that *ottoe* was described from an abnormally light specimen. The fact that intergrades of every degree are found strengthens this belief. Typical specimens from Pilger (2 ♂), Omaha (1 ♂ 1 ♀,) Hackberry Lake, Cherry County (1 ♂).

H. OTTOE form OGALLALA (Leussler). As stated above, this is the normal form of the early brood. It is found only in native prairie in late June and early July. Has been taken at Omaha, Lincoln, West Point, Pilger, Hackberry Lake and Wauneta, near the Colorado line.

H. OTTOE form PAWNEE (Dodge). This, the late brood, makes its appearance about August 25. The type locality is about 35 miles northwest of Fremont, and not far from there I have found it abundant upon a number of occasions. It is partial to the flowers of blazing star (Liatris).

138. HYLEPHILA PHYLAEUS (Dru.). Rare. Taken only in some years. Omaha, Papilion, Blair, and reported from Dodge County by Dodge. Frequents wild asters and the blossoms of alfalfa.

139. POLITES VERNA (Edw.). Very rare. 1 specimen taken at Omaha, July 3, another July 5, 1912; 1 at Plattsmouth, June 26, 1930.

140. P. MANTAAQUA (Scud.). I have found this only in two pieces of native prairie land near Omaha and never in large numbers. Some specimens appear intermediate between

typical *manataaqua* and the western race *rhena* (Edw.).

P. MANATAAQUA race RHENA (Edw.). Not uncommon in Sioux County in June and July.

141. P. THEMISTOCLES (Latr.). Our commonest skipper. Found over the entire state. Most numerous in June and again in August.

142. P. MYSTIC race DACOTAH (Edw.). Common in Sow Belly Canyon, Sioux County in June 1911. In June, 1918, F. H. Shoemaker collected a long series at Bazile Mills, some of which were dark, heavily marked specimens like typical *mystic* from eastern states, but most of them were race *dacotah*.

143. P. CORAS (Cram.). A very common skipper of general distribution throughout the state; flies with *themistocles*, the seasons being about the same.

144. ATALOPEDES CAMPESTRIS (Bdv.). Very common, at least as far west as Valentine; June to October. The late fall brood is much darker on under surface than the earlier broods.

145. CATIA OTHO (A and S.) race EGEREMET (Scud.). Rather local but found regularly at Omaha the latter part of July; partial to flowers of bergamot.

146. ATRYTONE LOGAN (Edw.). Rather rare. Specimens from Omaha, Lincoln, West Point, Meadow and Plattsmouth, all taken in June and July.

A. LOGAN race LAGUS (Edw.). Not uncommon in Sioux County in July, and has also been taken in Cherry County. This race has the ground color paler and the black borders much narrower.

147. A. AROGOS (Bdv. and Lec.). Formerly quite common, now found only where original prairie remains. Single brooded; flies from about June 20 through July. Omaha, West Point, McCook and Oconto.

148. A. VESTRIS (Bdv.). Found over the entire state, being common in the western part. Apparently double brooded for it has been taken in every month from June to September.

149. A. BIMACULA (G. and R.). Very local; I have taken specimens in only two moist meadows at Omaha and in another similar meadow at Valley, early part of July. At the latter locality a female without spots was taken, *contradicta* Leussler.

150. A. DION (Edw.). Not uncommon but very local, being found only in marshy places where wild rice and marsh grasses grow. Late June to middle of July. Omaha, Waterloo and Valley.

151. A. PONTIAC (Edw.). Frequents the same localities as

the preceding species and flies in company with it. It makes its appearance perhaps a week later but its season is overlapped by that of *dion*. Nebraska specimens are very much larger than those from eastern states.

152. POANES VIATOR (Edw.). Another marsh species, but more rare in the state than either *dion* or *pontiac*. July. Omaha, Valley and Hackberry Lake.

153. P. HOBMOK (Harr.). Common; single brooded; appears about Memorial Day and flies throughout June. Omaha, Lincoln, West Point, Neeley, Valentine, Cedar Bluffs and Harrison. Although I have collected hundreds of specimens I have never found the dark female Pocahontas (Scud.). in the state.

154. P. TAXILES (Edw.). Common in the canyons of Sioux County. Appears last week in June and remains through most of July. Fond of the flowers of bergamot.

155. ATRYTONOPSIS HIANNA (Scud.). Common in the sand hills of Cherry County where it appears to be particularly attracted to the yellow puccoon flowers which abound there. Has been taken in Sioux County also and at West Point. It is subject to much variation in the number and size of spots, both above and beneath. Flies from the end of May well into June.

156. AMBLISCIRTES VIALIS (Edw.). Fairly common in the eastern part of the state especially where patches of vetch are found, the flowers of which prove attractive to it. Double brooded, about the first of May and about the middle of July.

157. A. OSLARI (Skin.). Common in the western part of the state. Usually found in wet, gravelly spots. Double brooded, first appearing between 10th and 20th of June, and the second about the middle of August. Specimens from Valentine, Bloomington and Harrison.

158. LERODEA EUFALA (Edw.). Found in the eastern part of the state, where it is sometimes quite abundant in September and October on a great variety of flowers, both wild and cultivated.

159. MEGATHYMUS STRECKERI (Skin.). Inhabits the sand hill regions where the yucca plant flourishes. Single brooded so far as known, appearing early in June. It is extremely variable with regard to size, wing shape, width of border on secondaries, size and shape of spots, depth of color of the yellow spots and border, and number of spots on under side of secondaries. It is this race which Dr. Holland figures in the revised Butterfly Book, Pl. LXXII, and to which he has given

the name *leussleri.*

SPECIES INCLUDED IN PREVIOUS LISTS BUT OMITTED FROM THE PRESENT ONE.

THECLA POEAS (Hub.) (*Strymon cecrops* Fabr.). Albert Cassell lists it as being found at Nebraska City and Barber from Nemaha County, on the authority of W. E. Taylor. Both are in the same general locality, and as *cecrops* is a well marked species, not easily confounded with any of the other hairstreaks, it seems fairly certain that it occasionally occurs in Nebraska.

LYCAENA FILENUS (Poey). Mentioned in Cassell's list as quite numerous at Nebraska City. *Filenus* is a synonym of *hanno* (Stoll), a species not likely to occur in Nebraska. It seems probable that *isola* (Reak,) is the species referred to.

The following are all included in Barber's list. Quotations are from the list; comments are the writer's. For the generic names in Barber's list it has been thought best to substitute those used in Barnes and Benjamin's check list.

ARGYNNIS ATLANTIS (Edw.). "West Point, Northern Nebraska. Not very common." I have seen no specimens from Nebraska.

EUPHYDRYAS PHAETON (Dru.). "Lancaster County (Mr. McMillan). Mr. Scudder in his map showing the distribution of this species indicates its presence in the extreme eastern portion of the state along the Missouri river." I know of no reason why it should not occur here but have seen no specimens taken in the state.

MELITAEA MINUTA (Edw.). "Sioux County." Probably *pola* (Bdv.), which is the species found in Sioux County.

POLYGONIA FAUNUS (Edw.). "Nemaha County (W. E. Taylor) Found occasionally." I fear this was a misidentification on Taylor's part.

BASILARCHIA ARTHEMIS (Dru.). "Nemaha County (W. E. Taylor) Rare." J. D. Gunder in an article on Basilarchia (Can. Ent. Feb. 1934) mentions *arthemis* and *proserpina* from Lincoln, Nebr. As neither Dr. Wolcott, Dr. Dawson, nor the many collectors among students of Nebraska University, had ever taken true *arthemis* in the state, I wrote to Gunder for particulars of the record. He replied that he had obtained the specimens through Lloyd Martin, of Roscoe, Calif. Mr. Martin in turn wrote me that he had obtained them from Geo. W. Baker of Lincoln, Nebr., and Mr. Baker, a young collector, informed me that whatever material he sent Mr. Martin has been collected locally but that he did not recall taking any white-banded *Basilarchia,* and thought he surely would have noticed

it if he had. Under the circumstances, I fear, the record must be classed as doubtful.

INCISALIA IRUS (Godt.). "Not taken by us in the state. Strecker says 'it occupies the same territory as *niphon* and *titus;*' and these two are found in the state, though uncommon." It is possible that this species occurs here but I have not seen any specimens taken in the state.

I. NIPHON (Hbn.). "Nemaha County (W. E. Taylor). Rare." Not impossible, but no Nebraska specimens found.

LYCAENA EPIXANTHE (Bdv. and Lec.). "Not taken by us in the state. Scudder says 'I find a memorandum of its occurence in Iowa and Nebraska', and Edwards credits it to Kansas." I can add nothing to the above.

PLEBEJUS SCUDDERII (Edw.). "Sioux County." In the collection of the University of Nebraska I found specimens labeled *scudderii,* from Sioux County, but the female proved to be *shasta* race *minnehaha* (Sud.) and the male *melissa* (Edw.).

ASCIA NAPI (L.) OLERACEA (Harr.). "Lancaster and Nemaha Counties (W. E. Taylor)." It is possible that in the early days this species did occur in Nebraska.

PAPILIO OREGONIA Edw. "Sioux County." Probably *brucei* Edw.

P. ZOLIACON Bdv. "Sioux County." This, too, probably refers to *brucei* Edw.

OARISMA POWESHEIK (Parker). "Not taken by us in the state. Scudder writes 'It flies in Iowa, Nebraska and Dakota according to Parker and Dodge'." Although I have not found it in Nebraska, I have found it in abundance at Lake Okoboji in northwestern Iowa, and therefore think it likely it may extend over the line into Nebraska.

POANES MASSASOIT (Scud.). "Dodge County (Dodge) Nebraska. (Prof. French Butt. East U. S.)" I have every reason to believe that this species has been taken in the state, although it has not been my good fortune to encounter it.

P. ZABULON (Bdv. and Lec.). "Dodge County (Dodge). Fort Niobrara (W. L. Carpenter) Lincoln, Nebraske City, West Point." I surmise that all of the above records refer to *hobomok.* An examination of the West Point and Lincoln specimens in the collection of the University of Nebraska tend to bear this out.

HESPERIA SASSACUS Harr. "Not taken by us in the state. Nebraska is mentioned by Prof. French in Butt. East U. S." I very much doubt that the true *sassacus* occurs in the state.

It is more likely to be *dacotae* (Skin.). which was described from Volga, S. D., and which I have taken sparingly at Lake Okoboji, Iowa.

H. LEONARDUS Harr. "Dodge and Nemaha Counties (W. E. Taylor)." I am inclined to think the above records rest upon a misidentification. Dark specimens of true *pawnee* somewhat resembles *leonardus* on the upper surface and may have been mistaken for the latter species.

OCHLODES SYLVANOIDES (Bdv.). "Not taken by us in the state. Mr. Edwards mentions this species for Nebraska in his list (Trans. Amer. Ent. Soc. XI? 1884, 311)." It is probable that Edwards had in mind the race he named *napa*, which I have taken in the Black Hills of South Dakota, and which it is conceivable may come into Nebraska.

P. OCOLA (Edw.). "New Halena, Custer County." Clearly a misidentification. A specimen labeled *Pamphila ocola* from New Halena, Custer County, was located in the collection of the University of Nebraska and proved to be a female *Atrytone bimacula.*

ATRYTONE ARPA (Bdv. and Lec.). "Not taken by us in the state. Edwards records it for the state in his list of butterflies. (Trans. Amer. Ent. Soc. VI. 1877, 54)." Most likely refers to *dion* (Edw.).

A. PALATKA (Edw.). "Nebraska. (Prof. French Butt. Of East. U. S.)" This too, most likely refers to *dion* (Edw.).

ERYNNIS ICELUS (Lint.). "Not taken by us in the state. Scudder in his map showing the distribution of this species indicates its presence over the entire state." I can add nothing to the above.

Marking the Amherst Insectary.

A founding-place of economic entomology as well as a founder were honored at Massachusetts State College, in Amherst, on September 30, when the original insectary was marked with a bronze plaque. Among those who gathered to do homage to Charles Henry Fernald, founder of the department of Entomology, was his son, Henry T. Fernald, of Winter Park, Florida. Both father and son taught entomology at Massachusetts State in the early days.

The building honored was originally 28 by 20 feet and was the headquarters for the fight against the Gypsy Moth in 1890. Charles Henry Fernald, who was the director of that fight, is an acknowledged founder of economic entomology.

Iridescence.

By WM. T. M. FORBES, Cornell University,
Ithaca, New York.

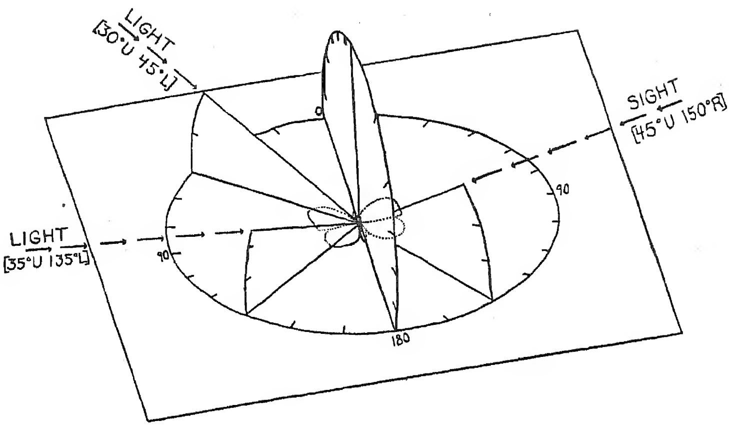
A delicate and complicated problem in describing butterflies is the specification of iridescence. It varies enormously from angle to angle, and in some cases, such as the basal spot on the fore wing of *Chlorippe,* the angle of easy vision is a limited one. Also the color seen, or even the portion of wing which may show iridescence, will change with the lighting and angle of vision.

A review of published descriptions shows a great variety of consistently ambiguous language. Most often one reads merely such statements as "wing brilliantly blue-iridescent at a suitable angle" or even vaguer ones. Perhaps once in a hundred times there is a warning to turn one's back to the window; to use diffuse (or concentrated) light, or a mention of grazing incidence.

In this paper I propose to specify, sufficiently accurately and as simply as possible, the angle of illumination and the angle of vision needed to bring out some well known cases of iridescence; and so illustrate what I hope may become a standard scheme.

Most cases of butterfly iridescence fall into one of two types. In such cases as the Morphos the light may fall from any direction (not too near grazing) and the sight is in the opposite direction and at about the same angle of elevation. In these cases the angle is not at all critical, and the direction not critical at all. I shall call such cases *Specular*. In the others the light must fall on the surface from a particular direction, and the angle of vision must be from some other fixed direction to give the maximum brilliancy. I shall call these cases *Oriented*. In most oriented cases the lines of illumination and of sight may be exchanged, and usually an inaccuracy of 15° or even somewhat more in a horizontal direction, makes very little difference.

In the case of specular iridescence it is obviously only neces-



sary to specify the vertical angle,—the same for light and for sight; but with oriented iridescence both light and sight must be specified separately, and the horizontal angle as well as the vertical. For the latter purpose I propose that we adopt the scheme of the diagram. Set the butterfly on a flat surface (black for translucent species); take the direction directly forward from the head as zero, directly to the sides as 90° (L and R), and directly behind as 180°. Then, since closer accuracy is of no advantage we may divide each right angle into sixths (15° intervals). So if the light should come about halfway from the front to the left side (considering the right pair of wings) we make the notation 45° L (see diagram). In the same way we may divide the vertical angle also into six equal parts, and for instance if the best angle is a little less than half way from horizontal to vertical (as in the diagram) we note 30° up (U). In exactly the same way we can specify the best angle from which to view the surface. For the diagram I have taken a case where the best view was somewhat to the right of, behind, and a little steeper than the angle of illumination (i. e. 45 U 150 R).

Obviously this method automatically becomes a formula. In the first case, instead of merely writing "fore wing iridescent blue" we can write "iridescence specular, 45 U," instead of some such statement as "iridescence best seen a little asym-

metrically" we can be specific with the formula: "iridescence oriented, light 30 U 45 L, sight 45 U 150 R." We have assumed that formulae are drawn up with the right side in mind, of course for the left side we must merely exchange "left" and "right" in reading our formula.

On the practical side we may suggest that a diffuse but fairly oriented light is usually best, such as a window a few feet away. It is a great convenience in judging angles to pin the insect with wing surfaces horizontal, on the middle of a flat block (white or black), and judge angles by the slope of the block rather than of the insect itself. When the block is lying horizontally on a table, a window usually gives an angle of "light" of 30 or 45 degrees,—to get a lower angle the block may be lifted toward the eye level, for a greater one it will be tilted. We also tend to hold the block nearer to ourselves than to the window, so our angle of "sight" is likely to be a unit greater than the angle of "light." This is usually best for seeing oriented iridescences. It is also convenient to remember that if the angles of "light" and "sight" are similar the butterfly is best held with our back to light; if they are nearly supplementary and not too steep we should have the light in front of us. In some cases the convenient position is with one's side to the light,—usually where the angles of sight and light are more or less at right angles, or the horizontal directions are opposite and the vertical angles moderately high. In the latter case we will be holding the butterfly tilted, with the pin-head pointing over a shoulder. Note that with low horizontal angles the head of the butterfly is toward the light (or observer), with high angles, the tail.

The following list of examples are chosen partly for variety, and partly to illustrate cases (such as *Talanga*) where present descriptions are completely ambiguous. The majority are from the Nymphalinae, famous for their varied types of iridescence.

Argynnis sagana ♀ (China). 1, oriented, light 30 U 90 L; sight 60 U 105 R. A rather faint green, especially on base of fore wing along veins and beyond the white fascia of hind wing. 2, (under side) 45 U 90 R; 60 U 105 L. Brilliant green on postmedial area of fore wing and fainter on the white markings.

3, 45 U 135 R; 60 U 75 L. The hind wing shows its iridescence at a somewhat different angle, because of the slant of its axis in the usual spreading position. The fascia shows faint pink at the same angle.

Phyciodes levina (South America). Specular 45. A not very brilliant blue.

2, oriented 45 U 90 L or R; 60 U 90 R or L. At a cross light of about this angle in either direction the blue goes greenish or brassy,—the effect is faint at other angles.

3, oriented 45 U 90 L; 90 U. A faint iridescence on the black ground. (As usual the hind wing needs a different angle, 60 L.)

Precis radama (Madagascar). Iridescence changeable. The best blue is seen at 90 U; 90 U, but so long as *viewed* from directly above the color is blue. Best violet 45 U; 30 U, viewed from opposite side from illumination; the best copper is at 20 U 90 R; 10 U 90 L.

P. artaxia (Africa). Blue base of fore wing specular, the angle not critical; the best (but very faint) violet nearly specular at 20 U; 10 U.

P. lavinia hubneri (South America). Oriented but not critical. Perhaps best green at 75 U 180; 75 U 75 L. Is good at 90 U; 90 U, but almost dead at 45 U; 30 U, where *radama* shows a very good violet. In general should be lighted at a higher angle than viewed and from the opposite side.

Salamis parrhasus (Africa) Changeable. The best green is at 30 U; 60 U, viewed from the same side as lighted, at any angle. Best brassy at 45 U; 30 U, viewed from *opposite* side; the best rose perhaps at 75 U 90 L; 90 U, and is quite critical, the irregularities of the surface destroying the effect in patches.

Callicore eluina (South America). 1, blue band specular, the angle not critical. The best copper at 75 U; 75 U, the deepest violet at grazing (perhaps 5° U).

2, the famous blue flash on hind wing is *oriented* 45 U 75 L; 60 U 60 L, and in general shows at steep angles with the light behind the observer.

3, Blue-green spot at base of fore wing same but less critical, —it still shows well at 60 U; 90 U.

C. gabaza (Columbia). 1, blue band specular and not critical, but is brassy at 75 U 60-120 R; 60 U 60-120 R.

2, oriented; 45 U 60 L; 60 U 75 L shows the best violet on the ground. It is not critical but is dead when the band is brassy.

C. asteria (Mexico). 1, oriented 30 U 0; 45 U 0. (i. e. illuminated and viewed from low angles and directly in front.) Anterior two thirds of hind wing deep purple; basal half of fore wing and inner margin of hind wing glossy blue-gray.

2, 60 U 0; 90 U. Basal half of fore wing purple, matching costal half rather than dorsal third of hind wing. Oriented but less critical.

C. neglecta (South America). 30 U 90 L; 60 U 90 R. This gives the best contrast of the two portions of the blue border of the hind wing, the band blue with gray-white edge.

2, 45 U 60 R, 60 U 120 L. Band violet, its edge green.

Perisama saussurei (South America). 1, partially oriented, 60 U; 90 U, shows best the blue patch on hind wing.

2, oriented, 45 U 90 L; 45 U 60 L shows black streaks on brown instead.

3, light blue of fore wing is semispecular, but most brilliant below cell at 45 U 135 L; 75 U 90 L, and most intensely blue perhaps at 45 U 90 L; 60 U 180.

4, the deep purple around it shows better at 45 U 135 L; 90 U.

5, at 30 U 90 L; 45 U 105 L both blues practically vanish.

6, line on hind wing specular and not critical.

Temenis laothoe (South America). This shows a good deal of local and individual variation. A very bright specimen (var. *violetta*) from the middle Napo shows:

1, oriented 45 U 0; 60 U 0. Best violet on border of hind wing.

2, oriented 60 U 180; 90 U. Best rose on disc of hind wing.

3, 60 U with any azimuth; 90 U. Deep violet on black part of fore wing (except border).

4, specular but limited, 90 U; 90 U shows blue on under side of hind wing and tip of fore wing,—becoming a rose flush at 45°.

5, to show most nearly the pure pigment buff color use oriented 15 U 180; 15 U 180.

A specimen from Peru with minimum iridescence lacks 1, 2, 3, but shows 4, 5.

Temenis pulchra (South America). Shows best purple on hind wing at a little steeper angles than *T. laothoe*,—45-60 U 0 or 180; 60-90 U 0 or 180.

(To be continued.)

The Mating and Egg-laying of Malacosoma americana (Lepid.: Lasiocampidae).

By JOSEPH L. WILLIAMS, University of Pennsylvania. and Lincoln University, Pennsylvania.

INTRODUCTION.

In a preceding paper, Williams (1938), an effort was made to verify double copulation among Lepidoptera, reported by Pictet (1931) for the European *Lasiocampa quercus*. Upon finding none of the species studied copulating in this manner, the author decided to confine his researches to the American species of the family Lasiocampidae, since *Lasiocampa quercus* is not an inhabitant of this country. Except for the author's paper (1938), those of Pictet (1931) and Norris (1932) are almost the only others that deal at length with copulation among Lepidoptera.

The study of copulation among Lepidoptera was suggested to me by Professor P. P. Calvert, to whom I am indebted for many kindnesses and valuable criticisms during the preparation of this manuscript. I am also grateful to Professor H. F. Grim of Lincoln University for many helpful suggestions and other circumstances, which made it possible to carry on this work.

EXPERIMENTAL METHODS.

Tent caterpillars (*Malacosoma americana* Fab.) were allowed to feed on wild cherry trees near Oxford, Chester County, Pennsylvania, until they were nearly grown. They were collected early on the morning of May the twenty-first, while most of them were still in their nests. The nests were pulled apart and the caterpillars were raked into lard cans. The cans were only filled one quarter full to prevent smothering the larvae. All pupae found in the nests were placed into a different container. The larvae were then taken to the laboratory, poured into long glass dishes and freed of excrement and other foreign matter. They were then placed into large evaporating dishes and carried to their cage.

The cage was a portion of a room, the dimensions of which were 9 ft. x 4 ft. 2 ins. x 7 ft. 4 ins. (2.743 x 1.337 x 2.354

meters). It had a door through which one could enter. One inner side was covered with ordinary wire window screen. The other three sides were lined with thick pasteboard, which covered over all cracks to prevent the caterpillars from escaping.

Wild cherry foliage was placed into two two-liter flasks filled with water, and put into the cage for food. The flasks were arranged so that the foliage rested against the walls of the cage, which enabled the caterpillars to crawl upon it to feed. Newspaper was folded and placed here and there on the floor. Many larvae pupated between the folded edges of the paper, which prevented them from crowding into the corners of the cage for this purpose.

The pupae were gathered each day in the following manner. With the aid of a pair of tweezers they were removed from the newspaper and corners of the cage and placed into a large evaporating dish. They were then scattered on the bottom of a wooden box, which was covered with clean newspaper. The box had a sliding door and its top was covered with wire screen. As the moths emerged, they were removed from the wooden box and placed into large paper boxes covered with wire screen. These breeding boxes had small doors cut in one side, which could be opened and closed. When a pair of moths began to mate, they were not disturbed until the male was firmly attached to the female. They were then removed by carefully sliding a smooth piece of paper between the box and legs of the insects. The insects and paper were then placed in wide-mouth glass bottles and observed. When the mating period was over, they were distributed in the following manner and further observed.

1. Several mated pairs were placed each into a half-pint milk bottle containing a strip of absorbent paper and plugged with cotton.

2. Some mated pairs were placed each into a half-pint milk bottle without the absorbent paper.

3. Several mated pairs were placed together in a large pasteboard box, like the breeding boxes.

4. Several mated pairs were placed together in a round cage, which fitted over a gallon jug filled with water containing wild

cherry twigs. The frame of this cage was covered with mosquito netting.

5. Mated and virgin females were placed upon twigs of apple, pear, peach, plum, maple, cherry, and oak. These twigs were kept in containers filled with water.

6. Mated and virgin females were placed upon twigs of dead pear, which had been in several fires on a refuse dump for two months.

7. Virgin females were placed in a large pasteboard box, like the breeding boxes, and observed for egg-laying.

8. The egg-laying orifices of mated and virgin females, unable to lay, were probed with bristles, which were used as mechanical stimulants, to try to induce egg-laying.

9. A juice expressed from the reproductive organs of the male was injected by means of a micro-pipette into the egg-laying orifice of females unable to lay in order to try to stimulate egg-laying.

10. The reproductive organs of virgin females that made no attempt to lay, of mated and virgin females unable to lay, and of mated females that had laid were dissected from the bodies, stained, mounted as slides and studied.

Results.

The adults began to emerge on June 10, and increased in numbers each day until the maximum emerged June 18th. After the 18th, daily emergings became fewer until the last of the moths emerged, June 21st. During this period, experimental observations were conducted upon the copulatory and egg-laying habits of this moth. They began to emerge around 4:00 p. m., Eastern Summer Time, and stopped around 7:00 p. m. As soon as they emerged from the cocoons, they crawled upon the sides of the box and in this position the wings were expanded. These moths became active around 11:00 p. m. and intermittently swarned sometimes for less, and sometimes for more, than a half an hour, with rest intervals of fifteen minutes or longer. These swarming intervals continued throughout the night until around 9:00 a. m. the following morning. After 9:00 a. m. they remained quiet until late in the evening, when

swarming at intervals began again. Matings took place during the swarming periods. If couples mated a half an hour before 9.00 a. m., they remained fastened together sometimes for a half a day. The total number of moths was approximately seven thousand. Five hundred other individuals were prevented from emerging by being parasitized. The same parasite reduced the number of emerging moths the preceding year. A factor which increased the yield of moths this year was the removal of the adults from the wooden box as soon as they emerged. Last year, the adults were allowed to remain in the wooden box with the pupae, and of a thousand pupae only 74 males and 17 females emerged. Perhaps the imagos disturbed the pupae and so caused the death of the latter.

With the aid of a dissecting microscope, more than five hundred matings were observed. In every case the penis was in the bursal opening. Many pairs were plunged into ether, which instantly killed them and a dissection of these moths revealed the penis to be only in the bursal opening. If a female mated later in the day, say between 9 and 11:00 a. m., she would lay between 11:00 p. m. of the same day and 9:00 a. m. of the following day. Sometimes the insects became active before 11:00 p. m., but activity ceased by 9:00 a. m.

Females that were placed in milk bottles and the pasteboard box without twigs (nos. 1-3 above) did not lay except in a very few cases. Less than a dozen cases took place under these conditions. Virgin females that were placed in a pasteboard box (no. 7) did not lay. Mated females laid eggs on the twigs of cherry in the round cage (no. 4). They generally begin by coiling the abdomen around a twig of .3 to .5 cm. in diameter. The selected spot is a fork between the petiole of a leaf and the stem. The laying is conducted in the following manner: The head of a female is on one side of the twig and her abdomen is coiled around the twig, so that its hind end faces the head. The eggs are placed in rows at right angles to the stem and are covered with the glue-like secretion of the accessory glands. The distance from one end of the egg mass to the opposite end, due to a sidewise movement of the abdo-

men, parallel to the stem, is about 20 mm. This movement continues while eggs are being deposited for from 55 minutes to 1¾ hours. While the female is depositing her eggs, her body moves forward to make room for the next row of eggs. If the row being deposited is not exactly smooth, she smoothes it out before continuing further. When the eggs are a little more than half-way around the twig, she crawls upon the petiole still depositing her eggs until the mass has nearly surrounded the twig. To complete the laying she moves her body forward over the eggs that were laid first, the accessory gland secretion having hardened sufficiently by this time to enable her to walk upon it. When oviposition is completed, some females are unable to pull themselves away and are left hanging to the egg mass. Others fly away, but life for them is very short, for many of them die within twenty-four hours.

A similar observation was made by Le Baron (1870) on the oviposition of this moth. He says: "Three female moths (presumably mated) were enclosed in a glass vessel. They were quiet during the day but became very restless as night approached, showing that like the moths in general, they are nocturnal in their habits. On the third day a twig of apple tree was introduced into the vessel. The moths immediately ran up upon it, and put themselves in a position for laying their eggs."

Generally, a female indicating readiness to lay crawls around on the bottom and sides of the box, vibrating her wings. Many females in this condition were picked up by their wings and placed upon twigs of different trees (no. 5). No cage is necessary when this method is practised because they begin to lay at once. They laid most eggs upon wild cherry. The next choice was apple; third, peach; fourth, pear, and the last, plum.

Mated females laid freely upon the dead pear twigs taken from a refuse dump (no. 6). They did not lay, however, upon oak and maple. Virgin females were tried in the same manner (nos. 5 and 6); a few were able to deposit less than a dozen eggs, after which they remained coiled around the twigs unable to lay.

Probing the egg-laying orifice with bristle or injecting the juice expressed from the male reproductive organs into it, failed to make these females lay (nos. 8 and 9).

A study of the reproductive organs mounted on slides (no. 10) showed empty egg tubes and empty accessory gland vesicles of females that had mated and laid. Mated and virgin females unable to lay and virgin females that made no attempt to lay showed the egg tubes filled with eggs and the vesicles of the accessory glands filled with secretion after death. The female *Malacosoma americana* mates only once. This habit differs from that of *Ephestia kuehniella*, which is known to mate up to five times. The bursa of *Malacosoma americana* is not as long as that of *Ephestia kuehniella*, but the greatest tranverse diameter is longer. The length of the virgin bursa of *Malacosoma americana*, including its neck, in fixed preparations averages 1.7 mm. Its greatest transverse diameter is about 1.5 mm. The length of the virgin bursa of *Ephestia kuehniella* averages about 3.5 mm. The length of bursa of a mated *Malacosoma americana* averages about 2 mm.; its greatest transverse diameter is about 2.2 mm. The length of the bursa of *Ephestia kuehniella*, that has mated only once is about 4.2 mm. The length of its greatest transverse diameter averages about 1 mm. Every egg mass of *Malacosoma americana* found on a tree represents one oviposition and the purpose of a female life fulfilled.

(To be continued.)

Average Number of Nymphs in the Egg-masses of Tenodera sinensis, (Orthoptera: Mantidae).

The egg masses of *Tenodera sinensis* vary much in size, a large mass measures one and a third inches, by an inch and an eighth, while the smaller ones measure an inch by seven-eighths of an inch. From a large mass 289 nymphs emerged, while from a small mass 139 emerged. This gives an average of 214 nymphs to an egg mass.

PHILIP LAURENT.

Current Entomological Literature

COMPILED BY V. S. L. PATE, LAURA S. MACKEY and E. T. CRESSON, Jr.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( ) follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—Cole, A. C.—Insect collecting in the Great Smoky Mts. National Park, Tenn. [J. Tenn. Acad. Sci.] 13:274-276. **Jenks, G. E.**—Marvels of metamorphosis. [Nat. Geogr. Mag.] 74:807-828, ill. **Kozhantchikov, I. V.**—On the role of metamorphosis in the zonal distribution of insects. [C. R. Acad. Sci. URSS] 20:199-201. **Lutz, F. E.**—The insect glee club at the microphone. [Natural History] 42:338-345, ill. **McClure, H. E.**—Insect aerial populations. [7] 31:504-513, ill. **Steyskal, G.**—Notes on preparation technique. [19] 33:235. **Weber, N. A.**—The food of the giant toad, Bufo marinus, in Trinidad and British Guiana with special reference to the ants. [7] 31:499-503. **Woodward, A.**—The "Honey" of the early California Indians—a strange ethnological error. [The Masterkey] 12:175-180.

ANATOMY, PHYSIOLOGY, ETC.—Balsac, H. Heim de.—See under Coleoptera. **Carlson, J. G.**—Mitotic behavior of induced chromosomal fragments lacking spindle attachments in the neuroblasts of the grasshopper. [Proc. Nat. Acad. Sci.] 24:500-507, ill. **Cooper, R. H.**—Notes on the internal anatomy of Canthon laevis (Coleo: Scarab.). [Iowa St. Coll. J. Sci.] 12:461-466, ill. **Cumley & Haberman.**—Serological investigation of Drosophila antigens with the complement fixment reaction. [6] 46:401-415. **DiMaria, G.**—Richerche sulla vita asettica. Studio sul fabbisogno vitaminico e sell'azione svolta dai microorganismi per lo sviluppo

della Sarcophaga. [Arch. Zool. Ital.] 25:469-507, ill. **Ditman & Weiland.**—The Metabolism of the corn ear worm. II.—Glycogen and moisture. [7] 31:578-587. **Englehardt, G. P.**—An incidental observation on phototropism. [19] 33:223. **Gerould, J. H.**—Structure actions of the heart of Bombyx mori and other insects. [Acta Zoologica, Stockholm] 19:297-353, ill. **Gosswald, K.**—Ueber den einfluss von verschiedener Temperatur und Luftfeuchtigkeit auf die Lebensausserungen der Ameisen. 1.—Die Lebensdauer okologisch verschiedener Ameisenarten unter den Einfluss bestimmter Luftfeuchtigkeit und Temperatur. [94] 151:337-381, ill. **Guareschi, C.**—Ricerche sperimentali sulla ninfosi degli insetti, II. [Arch. Zool. Ital.] 25:133-197, ill. **Harries & Henderson.**—Growth of insects with reference to progression factors for successive growth stages. [7] 31:557-572. **Haskins & Enzmann.**—On a characteristic somatic modification induced by adverse environmental conditions in Drosophila. [6] 46:453-455. **Hsüeh, Mu-Lien.**—A study of the treacheation and venation of Gampsocleis gratiosa (Orth:Tettigon.). [Peking Nat. Hist. Bull.] 13:19-27, ill. **Korschelt, E.**—Einige Bemerkungen zur Frage des Muskelansatzes und der Muskelnervenverbindung. [94] 151:286-290. **Lotmar, R.**—Untersuchtungen ueber den Eisenstoffwechsel der Insekten besonders der Honigbiene. [Rev. Suisse Zool.] 45:237-271. **Ludwig & Fox.**—Growth and survival of Japanese beetle larvae reared in different media. [7] 31:445-456. **Mueller, K.**—Histologische Untersuchungen ueber der Entwicklungsbeginn bei einem Kleinschmetterling (Plodia interpunctella). [94] 151:192-242, ill. **Pflugfelder, O.**—Weitere experimentelle Untersuchungen ueber die Funktion der corpora allata von Dixippus morosus. [94] 151:149-191, ill. **Platania, E.**—Ricerche sulla struttura del tubo digerente di Reticulitermes lucifugus, con particolara riguardo all natura, origine e funzione della peritrofica. [Arch. Zool. Ital.] 25:297-328, ill. **Rau, Phil.**—Additional observations on the sleep of insects. [7] 31:540-556, ill. **Snodgrass, R. E.**—Evolution of the Annelida, Onychophora and Arthropoda. [Smithson. Misc. Coll.] 97, no. 6:1-59, ill. The loral plates and the hypopharynx of Hemiptera. [10] 40:228-236, ill. **Stanley, T.**—The egg-producing capacity of populations of Tribolium confusum as affected by intensive cannibalistic egg-consumption. [Can. J. Res.] 16:300-306. **Stirrett, G. M.**—A field study of the flight, oviposition and establishment period in the life cycle of the European corn borer, Pyrausta nubi-

alis, and the physical factors affecting them. [Scientific Agr.] 18:355-369; 462-484; 536-557; 568-585; 656-683, ill. **Szekessy, W.**—Ein bisher unbekannter sprungapparat bei Koleopteren. [97] 58:435-440, ill. **Terio, B.**—Influenza della luce bianca e delle luci monocromatiche sullo sviluppo somatico e sulla funzionelita degli organi genitali esperienza zu Sarcophaga carnaria. [Arch. Zool. Ital.] 25:457-468, ill. **Walker, E. M.**—The cervical and thoracic exoskeleton of Grylloblatta. [Trans. R. Soc. Can.] 32(3):151. On the anatomy of Grylloblatta campodeiformis. 3.—Exoskeleton and musculature of the neck and thorax. [7] 31:588-640, ill. **Wight & Barua.**—Toxicity of mercury vapor to insects. [31] 142:754. **Williams, E. C.**—Spermatogenesis of a Mantid, Choeradodis rhombicollis. [Trans. Amer. Micros. Soc.] 57:387-394, ill.

ARACHNIDA AND MYRIOPODA.—Aragao, H. de Beaurepaire.—Nota sobre os Ixodideos da Republica Argentina. [111] 33:319-327. **Chamberlin, R. V.**—New Diplopods. [95] 51:205-208. **Fage, L.**—Quelques Arachnides provenant de fourmilieres ou de termitieres du Costa Rica. [Bull. Mus. Nat. Hist. Nat., Paris] 10:369-376, ill., (*). **Grandjean, F.**—Observations sur les Tydeidae. [Bull. Mus. Nat. Hist. Nat., Paris] (2)10:377-384, ill. **Hubbard, W. E.**—Ophiopneumicola colubri n. gen., n. sp., a lung mite from a snake. [Trans. Amer. Micros. Soc.] 57:400-406, ill. **Jenks, G. E.**—See under General. **Loomis, H. F.**—New and noteworthy Millipeds from Cuba, collected by Dr. P. J. Darlington in 1936. [Bull. M. C. Z., Harvard] 82:429-480, ill. The Cambaloid millipeds of the U. S., including a family new to the fauna and n. genn. & spp. [50] 86:27-66, ill., (k). **de Mello-Leitao, C.**—Notas sobre Alacranes Argentinos. [Not. Mus. La Plata] 3; Zool. no. 9:83-95, ill. (*). **Savory, T. H.**—Notes on the biology of harvestmen. [J. Quekett Microsc. Club] 1 (4): 89-94. **Sellnick, M.**—Eine neue Anoplocelaeno-Art aus einem Nest der Blattschneiderameise Atta sexdens (Acar.). [34] 122:5-70, ill., (*). **Stiles, K. A.**—The first record of the black widow spider (Latrodectus mactans texanus) from Iowa. [Proc. Iowa Acad. Sci.] 44:213.

THE SMALLER ORDERS OF INSECTS.—Banks, N.—Notes on native Myrmeleonidae (Neuropt.). [7] 31:413-421, ill., (k*). **Bragg, A. N.**—An early swarming of termites. [Proc. Okla. Acad. Sci.] 18:17. **Eastham, L.**—Movements of the gills of Ephemerid nymphs in relation to the water cur-

rents produced by them. [J. Quekett Microsc. Club] 1(4): 95-99. **Eichler, W.**—Einige bemerkungen zur Ernahrung und Eiablage der Mallophagen. [I. Sitzgber. Ges. Naturforsch. Fr. Berlin] 1937:80-111. **Ghidini, G. M.**—Ninfe-soldati in Reticulitermes lucifugus ottenute in allevamento. [Arch. Zool. Ital.] 25:93-109, ill. **Hood, J. D.**—Seven new Phlaeothripidae from the United States (Thysanoptera). [19] 33:205-218. **Kennedy, C. H.**—Aeshna biliosa, a new dragonfly from Andean Ecuador and Peru. [7] 31:573-576, ill. **Menon, R.**—Two n. spp. of Pachytroctidae (Copeognatha) with a note on the family. [Proc. Ind. Acad. Sci.] 8(B):280-287. **Milne, M. J.**—The "Metamorphotype Method" in Trichoptera. [6] 46:435-437. **Rogers, A. F.**—Fossil termite pellets in opalized wood from Santa Maria, California. [Amer. J. Sci.] 36:389-392, ill. **Womersley, H.**—On two n. spp. of Protura from Iowa. [19] 33:219-223, ill. (k).

ORTHOPTERA.—Drake & Decker.—Grasshoppers in Iowa in 1936. [Proc. Iowa Acad. Sci.] 44:189-192, ill. **Gould & Deay.**—The biology of the American cockroach. [7] 31:489-498, ill. **Rehn, J. W. H.**—Notes on the genus Haaniella with the description of a n. sp. (Phasmatidae). [1] 64:367-371.

HEMIPTERA.—Allard, H. A.—Notes on some Cicadas in Virginia and West Virginia. [6] 46:449-452. **Beamer & Lawson.**—The gen. Acinopterus (Cicadell.). [7] 31:476-488, ill., (k*). **Caldwell, J. S.**—Three n. spp. of Psyllids and the description of the allotype of Livia opaqua. [7] 31:442-444, ill. **Decker & Andre.**—Biological notes on Blissus iowensis (Lygaeid.). [7] 31:457-466, ill. **Dias & Torrealba.**—Infeccao naturae do Eutriatoma maculata pelo Schizotrypanum cruzi, no Brazil e na Venezuela. [111] 33:249-252, ill. **Hungerford, H. B.**—Mesoveloidea williamsi—a note on its distribution. [19] 33:218. **Knull & Auten.**—Some Erythroneura from the southwest (Cicadell.). [7] 31:532-539, ill., (*). **Metcalf, Z. P.**—The Fulgorina of Barro Colorado and other parts of Panama. [Bull. M. C. Z. Harvard] 82:277-423, ill., (k*). **Ruckes, H.**—Two n. spp. of Brochymena (Pentatom.) from Arizona. [19] 33:236-242, ill. **Spooner, C. S.**—Berbid field days. [Trans. Ill. St. Acad. Sci.] 30:315-316. **Strom, L. G.**—N. spp. of Aphids with notes on described forms. [7] 31:471-475, ill.

LEPIDOPTERA.—d'Almeida, R. F.—Nota supplementar a "Revisao das Terias Americanas" (Pierid). [111] 33: 231-247, ill., (S). **Bell, E. L.**—A catalogue of the original descriptions of the Rhopalocera found north of the Mexican border. [Bull. Cheyenne Mt. Mus.] 1; no. 1. **Clark & Clark.**—Notes on Virginia butterflies. [95] 51:177-181. **Oiticica Filho, T.**—Uma nova especie do genero Eacles (Syssphing.). [111] 33:281-290, ill., (S). **Scott, F. B.**—Notes on Indian hawkmoths. [J. Darjeeling Nat. Hist. Soc.] 13:74-89, ill. **Stirrett, G. M.**—See under Anatomy. **Travassos Filho, L.**—Contribuicao ao conhecimento dos Euchromiidae genero Corematura. [111] 33:259-262, ill., (S). Contribuicao ao conhecimento dos Euchromiidae. I.—Genero Desmotricha. [111] 33:39-48, ill., (S*). **Warren, B. C. S.**—On the evolution of subspecies as demonstrated by the alternation of variability existing in the subspecies of the genus Erebia. [J. Linn. Soc. London] 40:305-323.

DIPTERA.—Cooper, K. W.—Concerning the origin of the polytene chromosomes of Diptera. [Proc. Nat. Acad. Sci.] 24:452-458. **Enderlein, G.**—Beitrag zur Kenntnis der Syrphiden. [II, Sitzgber. Ges. Naturforsch. Fr. Berlin] 1937:192-237, (S*). **Harant & Richard.**—Introduction synoptique a l'etude des larves de Nematoceres. [Bull. Soc. Etude Sci. Nat. Beziers] 41:76-89. **Heiss, E. M.**—A classification of the larvae and puparia of the Syrphidae of Illinois exclusive of aquatic forms. [Ill. Biol. Monogr.] 16, no. 4: 104 pp., ill., (k). **Hurlbut, H. S.**—Further notes on the overwintering of the eggs of Anopheles walkeri with description of the eggs (Culic.).]J. Parasitology) 24:521-523. **Jenks, G. E.**—See under General. **Lopes, H. de Souza.**—Notas sobre Sarcophagidae Neotropicos. [111] 33:333-348, ill., (*). **Pechuman, L. L.**—Additions to the New York State list of Tabanidae. [6] 46:457-460. **Richards, A. G.**—Notes on the biology of mosquitoes of Long Island, N. Y., with special reference to the species found on and adjacent to the salt marsh (in Mosquitoes & Mosquito Control on Long Island). [N. Y. S. Mus. Bull.] 316:123-180, ill. **Ronna, A.**—Piolho ou pulga de abelha (Braula caeca). [Rev. Dep. Nac. Prod. Animal] 3:143-148, ill. **Rulitzov, I. A.**—The development centers and migration routes of Simuliidae (in Russ.). [Priroda] 7-8:73-83, ill. **Sabrosky, C. W.**—Taxonomic notes on the Dipterous family Chloropidae. I. [6] 46:417-434, ill., (k*). **Stone, A.**—The horseflies of the sub-

family Tabaninae of the Nearctic region. [U. S. D. A. Misc. Publ.] 305:1-172, ill., (k*). **Weyer, F.**—Ein zwitter von Culex pipiens. [34] 123:184-192, ill.

COLEOPTERA.—Ballou & Seipmann.—Hister ciliatus recorded from Arizona. [19] 33:242-243. **Balsac, H. Heim de.**—Commensalisme ornithophile de Coleopteres Staphylinides; son determinisme par exigenees thermique de maturation des gonades. [C. R. Acad. Sci., Paris] 207:644-646. **Blackman, M. W.**—The genus Chramesus in North America (Scolytid). [91] 28:534-545, ill., (k*). **Chamberlin, W. J.**—New Buprestidae from California. [6] 46:445-447. **da Costa Lima, A.**—Um novo gorgulho, broca da couve (Curculio.). [111] 33:49-52, ill., (S). See under Hymenoptera. **Saylor, L. W.**—Some new Neotropical Scarab beetles. [95] 51:185-190. **Schedl, K. E.**—Scolytidae und Platypodidae. 48. Beitrag die Gattungen Coccotrypes, Poecilips, Thamnurgides und Dendrurgus, nebst Beschreibung einer neuer Art. [58] 10, no. 219:8-12, ill., (Sk*). **Seevers, C. H.**—The termitophilous Coleoptera occurring in the United States. [7] 31:422-441, ill., (*).

HYMENOPTERA.—Batt, R.—Der bienenwolf (Philanthus triangulum). [Natur & Volk] 68:291-295. **Breland, O. P.**—Phylogeny of some Callimomid genera (Chalcid.). [6] 46:355-400, ill. **Cockerell, T. D. A.**—Bees collected on the California islands in the spring of 1938. [Trans. San Diego Soc. Nat. Hist.] 9(9):37-38. **da Costa Lima, A.**—Sobre dois Calcidideos parasitos de larvas de Curculionidae (Pteromalid). [111] 33:329-331, ill., (S*). **Ditmars, R. L.**—A colony of parasol ants. [Bull. N. Y. Zool. Soc.] 41:183-188, ill. **Gahan, A. B.**—Notes on some genera and species of Chalcidoidea. [10] 40:209-227, (k*). **Gontarski, H.**—Aus dem Leben der Bienenkonigin. [Natur & Volk] 68:284-291, ill. **Jenks, G. E.**—See under General. **Kapabaeb, B.**—The biology of the honey ant. [Priroda] 9:75-76, (in Russ.). **Krombein, K. V.**—Descriptions of four new wasps (Sapygidae, Sphecidae). [7] 31:467-470. **Michener, C. D.**—American bees of the genus Heriades. [7] 31:514-531, ill., (k*). **Middlekauff, W. W.**—Occurrence of an European sawfly, Acantholyda erythrocephala (L.), in New York State. [6] 46:438. **Pate, V. S. L.**—Studies in the Pemphredonine Wasps (Sphecidae).—II.—Records and descriptions of new forms in the Ammoplanoid Complex from the south-

western United States. [1] 64:373-420, ill., (k*). **Rau, Phil.**—Studies in the ecology and behavior of Polistes wasps (Vespid.). [19] 33:224-235. **Scheuring, K.**—Bemerkenswerten Brutplatz der Mauerbiene. [Natur & Volk] 68:351-352, ill. **Soraci, F. A.**—Distribution of the sawfly (Acantholyda erythrocephala L.) in New Jersey [6] 46:444. **Stitz, H.**—Einige Ameisen aux Mexiko. [I. Sitzgber. Ges. Naturforsch. Fr. Berlin] 1937:132-136, ill., (*). **Walrecht, B. T. T. R.**—Nog eens: de overwintering van Vespa crabro. [58] 10:31-32. **Weber, N. A.**—See under General. **Zahl & Haskins.**—Black demons of the jungle (Formicidae). [Nature Mag.] 32:15-17, ill., (S).

Special Notices.

Annual Report of the Institute for Medical Research for the Year 1937. By A. Neave Kingsbury, Director. Federated Malay States, Kuala Lumpur, v + 174 pp., 1938.—This Institute for Medical Research comprises Divisions of Bacteriology, Chemistry, Entomology, Filariasis Enquiry, Malaria Research, Pathology, Rat Virus Enquiry, and a Serological and Medico-Legal section. The work of at least four of these includes entomological topics. A general review of the work of the year is furnished by the Director preceding the more detailed reports from each division. It appears that filariasis, including at least 50,000 cases of elephantiasis, is more wide-spread than had been previously thought. Researches by Mr. E. P. Hodgkin indicate that five species of the mosquito genus *Mansonia* are actual or possible carriers of *Wuchereria bancrofti* and *Microfilaria malayi*. The number of species of anopheline mosquitoes acting as carriers of malaria continues to be increased. Much attention is being given to investigations of rural tropical typhus, considered to be caused by the same virus as Japanese River Fever, and to urban tropical typhus and the question of transmission of the latter by the rat flea, *Xenopsylla cheopis*.

Endemic Filariasis in the Federated Malay States. By J. Orde Poynton and E. P. Hodgkin. Bulletins from The Institute for Medical Research, Federated Malay States, Kuala Lumpur, No. 1, 1938. 67 pp., 1 colored plate illustrating typical elephantiasis due to *Microfilaria malayi*. — From the summary of conclusions we quote as follows: Two species of the *Filariidae* are responsible for filariasis in the Federated Malay States. *Wuchereria bancrofti* is found sporadically

distributed among immigrants from India and China, but is only rarely transmitted in this country. *Microfilaria malayi* is endemic in certain riverine areas, in which it is transmitted freely by certain mosquitoes of the genus Mansonia. Infestation with *Mf. malayi* may give rise to adenitis, periodic lymphangitis, and to elephantiasis in which the feet and legs are typically involved. The intensity of endemic filariasis on the lower reaches of the Pahang, Perak and Bernam rivers is sufficient to warrant action towards arresting the spread of this disease, being responsible for a considerable degree of incapacity among adult males. At the present time the disease is tending to increase in certain areas, and it is in these in particular that action is indicated as numbers of children are becoming involved. The methods of treatment at present available are not satisfactory, and there is scope for further experimentation in this direction. The control of the vector mosquitoes presents many difficulties, but is the logical method, combined with other means of interrupting transmission, by which to approach the elimination of the endemic filariasis that is caused by *Mf. malayi* in this country.

OBITUARY

Guillaume Severin.

The compte rendu of the monthly meeting of the Entomological Society of Belgium of August 6, 1938, states: We have learned of the decease, on July 23 last, of M. Guillaume Severin, former member of the society and honorary conservator of the entomological section of the Royal Museum of Natural History of Belgium. M. Severin died suddenly of an embolism while he was determining some insects captured by him the day before. The *Faune* of M. Lameere was found open by his side. An obituary notice by M. Lameere will appear in this number.

We translate this notice as follows: Guillaume Severin (1862-1938) by A. Lameere. Our former colleague died unexpectedly, the 23d of July last, aged 76 years, at Saint Idesbald. Although even before his retirement as conservator from the Museum of Natural History on reaching the age limit, he had withdrawn from our society, the services which he rendered to entomology in our country are too important that we should forbear to pay him an affectionate tribute.

G. Severin, born at The Hague, was a decorative industrial designer at Liége when his health, momentarily weakened, brought him to the attention of Dr. Ernest Candèze. Our illustrious colleague advised him to go out as much as possible in the open air, and, that he might have some objective for his walks in the country, to interest himself in insects. Thus it was that G. Severin became an entomologist and began to occupy himself with the Coleoptera. In 1889 he published in our *Annales* a *Catalogue des Gyrinides*. On the recommendation of Dr. Candèze and of Edmund de Selys-Longchamps, who had come to appreciate his merits, he was named, on the resignation of Alfred Preudhomme de Borre, aid-naturalist to the Museum, then promoted to be conservator of the section of Articulata. He fulfilled these functions with a remarkable comprehension of his duties and with untiring devotion. Under his excellent administration, and thanks to his enlightened zeal, the collections made real progress and he contributed much to bring us new adepts in entomology. We owe to him the creation of ecological collections of native insects, in the formation of which he devoted years to the exploration of the country.

He interested himself actively in the organization of the International Congress of Entomology and was the secretary of the first congress, held at Brussels, in 1910. His relations with foreigners permitted him to determine to which of the different museums of Europe collections should be sent to be studied. It was he also who assumed the task of obtaining collaborators for the *Catalogue des Collections d'Edmond de Selys Longchamps* and overseeing the publication of this valuable summary.

G. Severin also devoted a portion of his activity to our School of Tropical Medicine, where he taught the doctors who were preparing to go to the Congo some ideas of entomology necessary for their mission.

From the moment when he was nominated to the Museum of Natural History, he consecrated himself entirely to his administrative functions and published only some papers on applied entomology as a member of the Superior Council of Waters and Forests.

Gifted with great intelligence, with highly developed practical sense, both artist and musician, of impulsive character, he had the affection of all entomologists. We shall preserve the fondest memories of him.

[This notice is accompanied by a portrait.] (Bull. & Ann. Soc. Ent. Belg. 78 (8-9), pp. 311-314, Sept. 26, 1938.)

We are indebted to Professor Lameere and to the Société Entomologique de Belgique, through its Secretary, M. A. Crèvecoeur, for permission to publish this translation.

The translator went to the Museum at Brussels on July 31, 1895, and "found M. Severin there to whom I delivered the letter of introduction from Baron de Selys and also one from Mr. Blandford of London. There also I met M. Lameere to whom M. Severin introduced me. M. Severin was very attentive and, as the Baron had requested in the letter, showed me the collection of insects, etc., and also the chief feature of this museum—the complete skeletons of the fossil reptiles known as Iguanodons found in Belgium. . . . "

Severin came to the United States on the occasion of the International Congress of Zoology held at Boston, in August, 1907, and subsequently visited museums in a number of cities, seeking support and subscriptions to the *Selys Catalogue*. Appeals which he later wrote for the same object were published in the NEWS for March, 1919 (volume xxx, pp. 84-85) and in *Science* (n. s. 49 (1263) :264-265, March, 14, 1919), in which he incidentally refers to the loss of his son in the great war, "a fine boy of 24 years, a captain of engineers." A later note on "The Cause of the Delay of Publication of the Selys Catalogue" by Severin appeared in the NEWS for October 1919 (xxx, pp. 229-230).

After his retirement from the Museum, in September, 1927, he lived for a while at La Panne, on the Belgian coast, not far from Calais. He came from there to Brussels in July, 1929, when we were at the Museum and gave us much assistance with de Sely's drawings and manuscripts in connection with a study of the Odonate *Palaemnema*. How great a help he was to the late E. B. Williamson is recorded in the latter's papers on American Gynacanthas and on *Heteragrion*.

His passing severs another link in the chain which bound us to the older students in Europe of the Odonata.

PHILIP P. CALVERT.

ENTOMOLOGICAL NEWS

VOL. L. MARCH, 1939 No. 3

Notes on the Behavior of Certain Social Caterpillars (Lepid.: Notodontidae, Arctiidae).

By PHIL RAU, Kirkwood, Missouri.

Naturalists today, in their study of societal evolution, realize the importance of gathering behavior data on organisms that have the ear-marks of the beginnings and also of the intermediate stages of socialization. Heretofore, social life among certain Hymenoptera and other highly socially organized insects was accepted without much thought as to the origin of such socialization. With the appearance, during the last decade, of books by Wheeler[1], Alverdes[2], and Allee[3] on the origin and evolution of social life among insects, one's attention is focused on the fact that social habits in one form or other, some weak and some strong, some at one stage of organic development, some at another, appear in insect groups that heretofore were thought to be entirely solitary. Certain beetles, bugs, caterpillars, and other insects have recently attracted attention because of behaviour patterns that indicate conditions of incipient social behavior.

The lepidopterous caterpillars that show a tendency in this direction have beeh all but neglected; some attention has, however, been given to the problem of the different types of social and sub-social behavior in caterpillars by Harold I. O'Byrne. In his paper entitled "Gregarious caterpillars[4]," he tells us that social behavior in these organisms has arisen independently in certain species belonging to at least twenty-four of the sixty families of Lepidoptera. Most important of all, however, is the service he has rendered us in classifying this behavior. He places the gregarious habit in five distinct categories: (1)

[1] Wheeler, W. M. The Social Insects. 1928.
[2] Alverdes, F. Social Life in the Insect World. 1927.
[3] Allee, W. C Animal Aggregations. 1931.
[4] Proc. Mo Acad. Sci. *3*: 103-108. 1937.

those which are gregarious only in early larval life, (2) those which are gregarious in the early stages and remain so until later larval stages, (3) those which remain gregarious through the various stages until the time for hibernation and then, upon awakening, pass the balance of the larval period as solitary caterpillars, (4) those which are gregarious at birth and remain so until ready to pupate, but which become solitary before pupation, (5) those which pupate without separating. He ends his paper with a plea for the acquisition of additional data on this subject and says that since our knowledge of the utility and also the meaning of gregariousness in caterpillars is almost *nil*, a serious need is felt for observational as well as experimental work. With these needs in mind, I paid some attention to a few species of social caterpillars during the summer of 1937, and the results of those observations follow.

DATANA PERSPICUA, Gr. & Rob.[5].

In a large and sunny field at the southwest edge of Kirkwood, grow numerous sumac bushes (*Rhus glaba L.*). There were about two hundred of them, three to four feet tall, growing very close together. On three such plants, (June 30, 1937) within a space of ten square feet, I found three colonies of the caterpillars of *Datana perspicua*. They were smooth-skinned caterpillars, conspicuously colored in black and yellow; each colony was on top of the leaves in the hot sunshine. They were in a somewhat loose mass piled one on top of another. The members of each colony were of one common size indicating that all the members of each colony had emerged at about the same time from one batch of eggs. In two of the colonies the caterpillars were very large, almost full grown, and in the third colony they appeared to be but a little more than half-grown. They were brought into the laboratory and placed in a large tin-can, with earth at the bottom and sumac leaves upon which to feed. In transporting them, they were much shaken up, and were not in close proximity to each other. During the afternoon in the nearly dark laboratory, they fed revenously on the

[5] All caterpillars were identified by Mr. H. I. O'Byrne, and all plants were identified by Dr. Edgar Anderson.

leaves until every bit was consumed. When I examined them at dusk, I found that all of them had formed into one large cluster and were very quiet on the little platform of criss-cross twigs. They remained in this compact position solidly for two days, and absolutely refused to leave the mass or to consume the food that I placed in the can from time to time. When they were examined at 7 p. m., on July 3, I found that they had moulted during the past twenty hours, and whereas they were smooth-skinned caterpillars before moulting, they were now very hairy. There were many shed skins on the floor of the can. During the process of moulting they remained together in the same large mass; but when I examined them next day, I found they had disbanded and had eaten every scrap of sumac leaf in the can, which at the time was badly wilted.

The caterpillars undoubtedly are more or less solitary when feeding but come together at night and also at certain other times for the purpose of moulting. I evidently disturbed this moulting process when I transported them to the laboratory. This theory is strengthened by the discovery of another colony in the same field, on July 5; here a population of about twenty caterpillars were for the most part scattered over two low bushes in the bright sunlight. Since no single individuals could be seen elsewhere on the bushes, it is evident that the caterpillars from one mass of eggs kept close to one another (even though not piled one upon another) in order to form a mass when necessity arose[6].

By July 9, all the caterpillars had pupated either on top of or in the soft moist earth at the bottom of the can. The pupae at first were of a bright yellowish-orange color, but soon changed to a very dark brown. Their bodies were quite flexible when they were in the highly colored stage, and they would awkwardly jerk about in trying to enter the soil. The skin became hard as it darkened, and if individuals did not succeed

[6] The return to this sumac field was for the purpose of studying the population of the caterpillars, but a thorough search revealed no more than the four colonies already mentioned on about two hundred sumac plants.

in entering the earth before hardening of the skin set in, they remained on top and this without any detriment to transforming into adults. The length of time spent in the pupal stage varied from eighteen to twenty-two days, for on July 27, they were beginning to emerge from the earth as adults. The adults spent their time quietly on the twigs in the cage depositing many eggs; these hatched after a period of incubation of two to three weeks.

DATANA INTEGERRIMA, Gr. and Rob.

A large cluster of caterpillars of this species was seen on a walnut tree (*Junglans nigra*) in my garden, on August 15, 1937. They were conspicuous caterpillars with longitudinal stripes of a dull brick color, and were piled one on top of another on the under side of several leaflets. They were very quiet and did not stir, even though the twig was cut and carried into the laboratory; they were just as quiet when, later in the day, they were carried out into the sunshine for photographing. About fifty were in the cluster and had evidently congregated for the purpose of moulting, because, up to the time of my retiring at midnight, not one of them moved from its original position. For the following two days, in fact, they did not move even a little way from the original position that each one held. It was only when I pinned the leaf-stem to the tree for photographing that I noticed with the aid of bright sunlight that some few were moulting. The heads of a few were going through jerky side-to-side movements, and occasionally a complete shed skin would fall to the ground. When I examined the cluster late that night (August 17) I found them to be of a sombre color and covered with long white hairs. Almost all of them had gone through the transformation, and not one had changed its position in the mass on the leaves. In moulting, the skin, that covers the head pops off first, asd very soon after this, the caterpillar works the skin from the body, permitting it to fall. Even though most of them had moulted, they continued to remain in the same quiet position; examinations made at 9 p. m., on the day that they moulted and also at 8 the next morning, found them immobile, limp, and still clinging to-

gether. Twelve hours later, however, or about one day after they had moulted, I found my hitherto lethargic caterpillars so active that most of them escaped by wedging themselves under the glass covering of the can. Many of them sought the window through which the light was streaming, and many of them were trapped in spider-webs. I regretted the escape because I was unable to note further the gregariousness of their behavior; this much was, at least, proven clearly: that they do cluster for moulting purposes, and that they do disband later, each going its own way once the process of moulting is completed. The caterpillars were large and seemed to be full-grown after the moult.

In *D. integerrima*, the gregarious behavior continues until time for pupation, when the larvae go to the ground and pupate singly[7]. In their communal movements in the tree, each caterpillar spins a strand of silk, and in large colonies the silk trails become broad enough to support several traffic lanes. Silk spinning in this species is confined to the making of roadways, for the larvae live exposed, making no shelter at any time.

The sense of smell is evidently well developed in these caterpillars, for when they escaped from my cage many of them entered another cage some distance away that contained a jar with fresh walnut leaves. They likewise entered the cage by wdging themselves under the glass sheet on top.

HYPHANTRIA CUNEA, Drury.

I was especially on the outlook for the conspicuous tents of the fall web-worm during a trip in July, through southern Illinois to Reelfoot Lake, Tennessee, and only two such colonies were encountered; one of these was at Reelfoot Lake in a clump of about fifty pecan trees (*Carya pecan* Engl. and Graebn.). These trees were from five to seven feet in height. The other was along the roadside near Tiptonville, Tennessee, in a clump of about a dozen trees of the same species. I spent two days driving about the lake, and was indeed surprised to find only two colonies in the large area covered. The caterpillars were brought into the laboratory on July 13, where many

[7] O'Bryne, Proc. Mo. Acad. Sci. *3*: 105. 1937.

of them pupated in their tents. About five weeks later, I found that they had transformed and died within the web. *Hyphantria cunea* larvae feed inside the nest, and enlarge the nest when necessary to enclose fresh leaves.

ATTEVA PUNCTELLA FITCH.

Each year I get a rich infestation of these moths in my Ailanthus trees, (*Ailanthus altissima*). This moth spends all of its stages in the very thinly-spun nests that it makes. Silk is merely used to bind leaves together with large open spaces in between as a sort of cradle. The colonies within these aerial cradles are never large and often contain caterpillars of various sizes. In mid-August, for example, I found nests contained the following population:

Nest A. 1 large, 1 medium caterpillar.
Nest B. 1 pupa.
Nest C. 3 empty pupal cases.
Nest D. 5 caterpillars, various sizes, small to medium.
Nest E. 1 large caterpillar in a dead curled leaf.
Nest F. 1 large in a dead curled leaf.
Nest G. 2 small caterpillar, 1 pupa.
Nest H. 1 large, 1 medium, 1 small (large one curled up in leaf).
Nest I. 1 pupa, 2 large larvae.

One often finds (as shown above) the large caterpillars curled up among dead leaves which are fastened together with silk; this may be in preparation for transformation. One also often finds an adult moth in the nest, and oviposition no doubt occurs in the same aerial cradle in which the mother was born.

The caterpillars remain on the ailanthus leaves until the middle of September. The silken cradles at this time often become quite large. A little later the leaves fall to the ground, but by this time the insect is probably safely in hibernation; I do not know, however, in what stage this occurs.

A New Syrphid Fly from Louisiana (Diptera).

By L. VIGÉ, Lafayette, Louisiana.

Toxomerus jussiaeae n. sp.

This species differs from *T. geminata* Say and *T. occidentalis* Curran in that the process of the hind femur of the male arises more distally, being slightly more than half as long as the dis-

tance from its base to the trochanter, and forms a greater angle with the femur; the basal prominence is lacking; the tibiae are not broadly produced apically; the yellow of the front on each side in the female is usually shorter and always more acute superiorly; the female lacks black bands on the hind femora and tibiae; the scutellum is reddish-yellow, and there is a silvery white spot above the front coxa in both sexes.

Length —5.5 mm. to 6.5 mm.

♂. Face yellow, grayish-tinged especially laterally below the antennae and on and about the tubercle, generally covered with silvery pubescence; cheeks black behind. Antennae reddish-yellow, first and second segments with distinct black hairs, third segment ferrugineous above and apically; arista black. Vertical triangle broad, black with rusty pollen and black hairs. Pile of front light; black hairs near the base of the antennae above and laterally. Eyes between vertical and frontal triangles less approximate and for a shorter distance than in either *T. geminata* or *T. occidentalis*, a distinct shining black spot at this point. Posterior orbits gray with white pile below the emargination of eye, rusty pile above.

Thorax greenish-rusty above, median cinerous line distinct throughout, lateral cinerous lines less conspicuous, yellow lateral margins complete; pleura black, gray pollinose, yellow at caudal portion of mesopleura much broader superiorly where it joins the yellow of the anterior superior part of the pteropleura, a silvery white spot on the sternopleura just below the yellow of the mesopleura, a similar but less distinct silvery spot above the front coxa.

Legs: front and middle coxae black, yellow apically; hind coxae mainly yellow, dark basally; all trochanters yellow; first and second femora yellow basally and apically, the main portion dark or black; hind femora arcuate, yellow at base, reddish apically, the main portion dark or black; the process long, dark, more remote from the base of the femur than in *T. geminata* or *T. occidentalis*, lacks the stout base, is distinctly curved and forms a greater angle with the femur; first and second tibiae and tarsi yellow, hairs mainly black; hind tibiae dark-red, normal apically (not dilated); hind tarsus with black hairs dorsally and yellow hairs ventrally, last two segments black.

Wings hyaline; stigma brown, color continued basally between the auxiliary and the first longitudinal veins.

Abdomen predominantly reddish-yellow; first segment black above, edges narrowly yellow; second segment black, a light median fascia broadest at the edges and interrupted; third and fourth segments each with a black fascia apically, semi-interrupted, and a median, black, geminate vitta (this may be reduced to mere spots); fifth segment with anterior median and two caudal lateral black spots (these represented by a median vitta joining a caudal fascia in some specimens and by spots or a median spot only in others). Two males, evidently quite young, lack practically all the black markings.

♀. Face with a black stripe descending from the front around each antenna and tapering on either side of the tubercle to its lower level, infuscate, especially above the oral margins and bordering the eyes. Antennae as in the male, third segment more generally ferrugineous. Front broad, black, black pile; yellow as follows—a usually short, triangular, lateral marking, acute above, ascends on each side from the yellow of the face, the yellow marking usually shorter and always more pointed at the top than in either *T. geminata* or *T. occidentalis.* Posterior orbits lighter than in the male medially.

Legs more yellowish than in the male; hind femora and tibiae less arcuate than in the male and lacking the characteristic black bands of *T. geminata* and *T. occidentalis.*

Abdomenal markings as in the male except on the fifth and sixth segments, each of which has a distinct black fascia apically and usually a single, median, black vitta.

Holotype: male, Evangeline Parish, LOUISIANA, May 8, 1938. *Allotype:* female, same locality and date.

Paratypes, 25 males and 25 females, all from Lousiana as follows—Evangeline Parish (May 30, 1937, 5♂, 3♀; June 26, 2♂; July 20, 1♂, 1♀; August 28, 1♀; September 13, 3♀; April, 1938, 1♂ 1♀; April 24, 3♂, 2♀; May 8, 2♂, 2♀). St. Landry Parish (May 15, 1938, 3♂, 2♀). East Baton Rouge Parish (June 16, 1937, 2♂, 2♀; June 27, 2♀; July 3, 1♂, 2♀; July 6, 1♂, 1♀; July 26, 1♀; August 7, 4♂, 2♀).

All the specimens collected by the author. They were all associated with one weed, *Jussiaea diffusa,* which grows in ponds and ditches.

The types were collected while in copulation. They were sent to the American Museum of Natural History, New York, N. Y.

The Mating and Egg-laying of Malacosoma americana (Lepid.: Lasiocampidae).

By Joseph L. Williams, University of Pennsylvania. and Lincoln University, Pennsylvania.

(Continued from page 50.)

Discussion.

In *Malacosoma americana,* one of our American relatives of the European *Lasiocampa quercus,* only one copulation is normal during the reproductive process. This method of copulating differs from that observed by Pictet (1931), for *Lasiocampa quercus.* He says (translated): "The male *Lasiocampa quercus* normally copulates twice with the same female. The first time is by placing himself on her left, which has the power of fertilizing the female through the vaginal orifice, then after detaching himself from her and being slightly distant from her for about twenty minutes, pairs a second time on her right in the egg-laying orifice, which has no other purpose except for causing the immediate laying of the eggs fertilized by the union on the left." Pictet stated further that the second copulation dilates the sphincter of the egg-laying orifice, for if it does not take place, the female must wait for muscular relaxation of the egg-laying orifice for five or six days, before beginning the act of egg-laying.

In *Malacosoma americana,* the penis was observed to be only in the opening leading to the bursa, which corresponds to the vaginal orifice of Pictet. This is normal for this species and is the only copulation performed by it. Mated females of *Malacosoma americana* are generally unable to lay when twigs of certain trees are absent, not because of a necessity for a second copulation. These twigs act largely as a mechanical stimulus; however, chemical stimulation is not entirely lacking, because mated females failed to lay on oak and maple. Pictet claims that females of *Lasiocampa quercus* must wait for five or six days before the act of egg-laying if the second copulation does not take place. Mated females of *Malacosoma americana* even in the presence of males died before five or six days, when twigs which act as a stimulus for egg-laying were absent.

British investigators have observed oviposition of *Lasiocampa quercus* and one of its varieties, *Lasiocampa callunae*. Some of these agree that immediate oviposition of a fertile female occurs only after she has been on wing, which they consider to be the stimulus for this act, and that the eggs are laid loosely. Bacot (in Tutt, 1900) reports that *Lasiocampa quercus* oviposits in from ten to twenty minutes after pairing, but he makes no mention of double copulation. All agree that the virgin females of *Lasiocampa quercus* lay after they have retained their eggs for several days. In some cases it is reported that the eggs even hatch parthenogenetically (Groom 1868, Laddiman 1878, Mory 1895, Rothschild 1920, and Tutt, British Lepidoptera 1:27, 3:42, quotes also Tardy and Weir).

Virgin females of *Malacosoma americana* generally cannot lay even when twigs are present and those that lay, lay fewer than a dozen eggs. Copulation must take place before they are able to lay. One of Pictet's conclusions is as follows: "A male which has fertilized a first female can copulate with a second (virgin), but no longer has the power of fertilizing her, because he copulates with the second only on the right, and because only the union on the left has the power of fertilizing. The female lays immediately, but her eggs, it is agreed, are not fertilized." Probing with bristle and various kinds of needles into the egg-laying orifice of virgin females of *Malacosoma americana,* to take the place of such a copulation in *Lasiocampa quercus,* failed to cause these virgin females to lay.

SUMMARY.

1. The object of this work was to verify in our American relative, *Malacosoma americana,* Pictet's (1931) observation of double copulation of the European *Lasiocampa quercus.*

2. Caterpillars were allowed to feed freely until they were nearly full grown. They were then captured and raised in captivity to form cocoons. Copulating experiments were conducted upon the moths that emerged from the pupae.

3. Observations for egg-laying were made by placing mated females in half-pint milk bottles. Both mated and virgin females were placed in paste-board boxes and also tried upon

twigs of wild cherry, apple, pear, dead pear, peach, plum, maple and oak.

4. Only mated females were able to lay, but only, except in a very few cases, in the presence of twigs of rosaceous trees noted in no. 3. Oak and maple twigs induced no egg-laying.

5. Virgin females were unable to lay, probably because they did not pair. Probing the egg-laying orifice with bristles and various kinds of needles and injection of liquid expressed from the male reproductive organs to induce egg-laying, as the second copulation is said to function in *Lasiocampa quercus,* failed to make them lay.

6. Only one copulation is normal for *Malacosoma americana,* and the penis is always found in the bursal opening.

REFERENCES.

BUCKLER, WM., 1888. Larvae of British Butterflies and Moths, 3: 57. London Ray Society.

G[ROOM], C. O. 1868. Smell of Oak Egger Moth, *Science Gossip,* p. 71.

LADDIMAN, R., 1878. Notes on Bombyx quercus, *The Entomologist,* London, 11: 270-271.

LEBARON, WM., 1870. "The Apple-Tree Tent-Caterpillar," *The American Entomologist,* 2: 143-146, Figs. 97 and 98.

MORY, EUGENE, 1895. "Parthenogenesis of B. quercus," *Societas entomologica,* Zurich-Hottingen, 10: (1) p. 3.

NORRIS, M. S., 1932. "Contributions towards the Study of Insect Fertility—The Structure and Operation of the Reproductive Organs of the Genera Ephestia and Plodia (Lepidoptera, Phycitidae)," *Proceedings Zool. Soc.,* London, pp. 595-611, 5 pls.

PICTET, A., 1931 (a). "Sur le double accouplement et la double ponte de Lasiocampa quercus L. (Lépidoptères," *Rev. suisse Zool.,* Geneva, 38: 373-375.

ID., 1931 (b). "Recherches experimentales sur le double accouplement et la double ponte de Lasiocampa quercus (Lépidoptères) et sur les consequences génétiques qui en resultant," *Rev. suisse Zool.,* Geneve, 38: 449-467.

ROTHSCHILD, Lord., 1920. "A Case of Parthenogenesis in

Lasiocampa quercus, L.", *Proc. Entomol. Soc.*, London, p. liv.

SEITZ, ADALBERT, 1913. "The Macrolepidoptera of the World, Bombyces et Sphinges palaearcticae," 2: 156. Stuttgart (Alferd Kerner).

SOUTH, R., 1907. "The Moths of the British Isles," series 1, p. 118-119. Frederick Warne & Co., London.

TUTT, J. W., 1899. "The Natural History of the British Lepidoptera," London, 1: 27.

ID., 1900. "The Natural History of the British Lepidoptera," London, 2: 436.

ID., 1902. "The Natural History of the British Lepidoptera," London, 3: 42, 87.

WILLIAMS, J. L., 1938. "The Mating of Ephestia kuehniella Zeller and Its Results," *Entomological News*, 49: (4), 104-107; (5), 121-126, 2 pls.

Notes on Melinaea lilis D. & H. With the Description of a New Subspecies. (Lepidoptera: Ithomiinae).

By RICHARD M. FOX, Academy of Natural Sciences of Philadelphia.

The forms of *Melinaea lilis,* distributed from southern Mexico to Bolivia and Venezuela, exhibit strikingly the geographic variation in color and marking so frequently observed among Neotropic Lepidoptera. The various subspecies fall naturally into two categories, so unlike at first glance as to have every appearance of being separate species. However, it is characteristic of this subfamily that examples closely similar are likely to belong to different genera, while forms quite unlike may be but developments of a single species. Hence, maculation and coloring are untrustworthy if used as sole characteristics for classification. One group of subspecies of the species under consideration has on the apical portion of the primaries two rows of large yellow spots forming bands separated by a solid band of black and preceded by another black band which crosses the distal end of the cell. Two black spots,

one within the cell and one immediately below it, are sometimes long enough to form a third dark band, or nearly so. The complete pattern of the secondaries exhibits a black, curved, median band running from apex to base like a dark festoon. In contrast, the other group of subspecies, while similar on the secondaries, has the tawny ground-color of the primaries reduced to the basal third of the wing, and the post-median and subterminal light bands are a series of separated chalky-white spots. For convenience these two groups of subspecies are here called respectively the yellow-spotted and the white-spotted forms, the relationship of which was recognized by W. T. M. Forbes, who published a usable key (1). Forbes' grouping was sustained in Bryk's catalogue (2).

Distributional considerations led both Forbes (1) and Godman and Salvin (3) to suggest that Salvin's *scylax* (4) may be a geographic race of *lilis*, but for present purposes *scylax* is recognized as separate.

MELINAEA LILIS PARALLELIS Butler

Melinaea parallelis Butler, Cist. Ent., i, p. 155 (1873)

With the median band of the secondaries complete, and the white markings of the primaries tending to be smaller than those of the next subspecies, this is the Central American representative of the white-spotted forms, being found in Panama.

MELINAEA LILIS MESSATIS (Hewitson)

Mechanitis messatis Hewitson, Exot. Butt., i, Mechanitis 4; pl. 9, fig. 4 (1855)

The median band of the secondaries is obsolete proximally in this Colombian subspecies. It is interesting to note that the Central American forms bear a greater emphasis on black than do the South American counterparts, respectively, yellow- and white-spotted. If *scylax* is admitted as a *lilis* form, its immaculate secondaries and general tendency toward emphasis on the lighter areas would pose a serious zoogeographic problem.

Forbes indicated his disappointment with the genitalia for determining species of this genus, he regarded the slight variation as possibly individual only (5). With *messatis* and *parallelis* agreeing with *lilis* in anatomic respects, and with the un-

mistakable, though curiously varied, *lilis* pattern present on the wings, it is necessary to accept Forbes' grouping of "perhaps too miscellaneous a series of forms" (6) as being correct.

MELINAEA LILIS DODONA Hopffer

Melinaea dodona Hopffer, Ent. Zeit. Stettin, xxxv, p. 344 (1874)

Lacking examples for study, judgment is here based on the literature. Apparently *dodona* represents a connecting link between the yellow- and the white-spotted forms. In pattern it resembles *parallelis*, but only the marginal series of dots is white, the others being yellow. It is found in Bolivia, to the south of any other *lilis* form.

MELINAEA LILIS IMITATA Bates

Melinaea imitata Bates, Ent. Mo. Mag., i, p. 55 (1864)

Distributed from southern Mexico to Costa Rica, this never has been recorded from as far south as Panama. It is yellow-spotted, but the black markings are more pronounced than in the nymotypic subspecies, and the post-median light band is tawny toward the distal margin, the two median spots nearly joined into a band.

MELINAEA LILIS LILIS (D. & H.)

Mechanitis lilis Doubleday, Hewitson and Westwood, Gen. Diurn. Lep., p. 130; pl. 17, fig. 4 (1847)

The post-median band is of clear yellow, the median band of the secondaries is complete. This subspecies is found in Venezuela and Colombia, the northerly record being Lion Hill, Panama (3). The area in northern Panama between the southern range of *imitata* and the northern limit of *lilis lilis* is neatly filled by *scylax*.

MELINAEA LILIS ezra new subspecies

In every respect, except the maculation of the primaries, this agrees with *lilis lilis*.

On the primaries dorsally the marginal dots are white, two larger ones being located at the apex with a smaller one below them, and two additional pairs, respectively between M_3 and Cu_1, and between Cu_1 and Cu_2. These last dots are small or vestigial and enclosed in black marginal triangles which in *lilis lilis* constitute the termini of the two dark bands. The light

sub-terminal band is composed of four yellow spots, each of which is margined with a narrow ring, not always complete, of tawny ground color. The post-median band is composed of a series of yellow angular spots more or less rimmed with tawny. The band separating these two yellow bands is not continuously black from costal to distal margins as in *lilis lilis,* but before reaching the marginal black triangle the black of the band irregularly fades into tawny so that the distal spots in the light bands are separated only by the ground color. The black median band ends at Cu_1, being replaced to the triangle by tawny. (In the male (type) the median band is continued by a faint thread-like streak along Cu_1, while in the female (paratype) by a similarly faint line toward Cu_2. If both of these streaks were on the same wing, they would form the outline of the continuation of the median band in *lilis lilis.*) There is yellow scaling at the anal angle and in the cell costally on the tawny sub-median area. The back spot in the cell and the one between Cu_1 and Cu_2 are as in *lilis lilis.*

Ventrally the primaries repeat the maculation of the dorsal face, exhibiting the same tendency for tawny to replace the black of the two dark bands and to encircle the yellow spots. The marginal white dots are stronger and the yellow spot in the anal angle more clearly defined than dorsally.

This form is affectionately named for Ezra T. Cresson Jr., who has fostered a whole generation of young Philadelphia entomologists.

Type. Male. "Minca, Magdalena, COLOMBIA, 2500 ft., July 24-25, 1920" (J. A. G. Rehn) (A. N. S. P., No. 7782).

One *paratype.* Female. "Hacienda Victoria, Sierra San Lorenzo, Magdalena, Colombia, 4100-4500 ft., July 23, 1920" (J. A. G. Rehn).

At present it is not clear to me whether this is an aberration accidently captured in the same general locality on two successive days, or whether *ezra* is a local race, possibly found along the lower Magdalena valley. Seasonal variation is a third possibility. A larger series of *lilis* forms from the region is essential before these questions can be answered with finality. However, two facts favor a decision that a subspecies is under consideration. First, *ezra* in macular development is consistent with the observation that the southerly *lilis* forms tend to be lighter than the northerly ones. Second, Mr. Rehn, who col-

lected both examples, was primarily interested in Orthoptera and made no special effort to gather a representative butterfly collection, but rather a sampling, during his Colombian trip. This pushes into the realm of extreme coincidence the theory that *ezra* is an aberration.

REFERENCES.

(1) FORBES, Jour. N. Y. Ent. Soc., xxxv, p. 29 (1927).
(2) BRYK, Lep. Cat., lxxx, pp. 472-474 (1937).
(3) GODMAN and SALVIN, Biol. Cent. Am., Rhop. i, p. 13 (1879).
(4) SALVIN, Ann. Mag. N. H., (ser. 4) vii, p. 412 (1871).
(5) FORBES, (op. cit.,) p. 24.
(6) FORBES, (op. cit.,) p. 28.

A Bibliography of Keys for the Identification of Immature Insects. Part I. Diptera.

By WM. P. HAYES, University of Illinois.

(Continued from page 10.)

CULICIDAE (continued).

KOMP, W. H. W. 1935. A key for the identification of the common mosquitoes of the southeastern United States. Reprint 836 from the *U. S. Public Health Repts.*, Vol. 38, No. 20, pp. 1061-1080. Revised 1935 (pp. 7-21.) (Key to larvae, p. 21; reprint is separately paged.)

ID. 1937. The species of the subgenus Kerteszia of Anopheles. *Ann. Ent. Soc. Amer.*, 30: 492-529. (Key to larvae (species), p. 519.)

LI, F. and S. WU. 1934. The classification of mature larvae of Chinese anopheline mosquitoes. In: *Entom. and Phytopath.*, 2: 61-66 and 81-100. (In Chinese.) (Keys and a long bibliography.)

MAIL, G. A. 1934. Mosquitoes of Montana. *Mont. Agr. Exp. Sta., Bull.* 288: 1-72. (Key to Montana larvae, p. 16.)

MARTINI, E. 1929-1931. Culicidae. In: *Lindner, Die Fliegen der Palaearktischen region.* Berlin, parts 11 and 12, pp. 1-398. (Various keys in Lieferungen 33, 35, 38, 46, 48 and 53.)

ID. 1923. Lehrbuch der medizinischen Entomologie. Fischer-Jena, 462 pp. (Key to larvae, p. 150.)

MATHESON, R. 1932. A handbook of the mosquitoes of North America. Thomas and Co., Springfield, Ill. (Many keys to larvae.)

MATHESON, R., and R. C. SHANNON. 1923. The anophelines of northeastern America. *Insec. Inscit. Menst.* 11: 57-72. (Keys to larvae, p. 58.)

MEILLON, B. 1931. Illustrated keys to the full-grown larvae and adults of South African anopheline mosquitoes. *Publ. So. Africa, Inst. Med. Res.* No. 28, Vol. 4, pp. 273-375.

MITCHELL, E. G. 1906. On the known larvae of the genus Uranotaenia. *Jour. N. Y. Ent. Soc.*, 14: 8-9. (Key to three species, pp. 8-9.)

ID. 1907. Mosquito life. Putnam and Sons, N. Y., 281 pp. (Key to eggs, larvae and pupae, pp. 216-258.)

PAINE, R. W. 1935. An introduction to the mosquitoes of Fiji. Fiji Dept. Agr. 1935, 29 pp. (Keys to larvae.)

PATTON, W. S. and F. W. CRAGG. 1913. A textbook of Medical Entomology. Christian Literature Soc. for India, etc., Calcutta, 768 pp. (This is James and Liston's key to larvae of Indian Anopheles, pp. 204-205.)

PEUS, F. 1934. Zur Kenntnis der Larven und Puppen der Chaobrinae (Corethrinae auct.) *Arch. Hydrobiol.* 27: 641-668. (Key to species of larvae, pp. 645-646, but no pupal key.)

PIERCE, W. D. and C. T. GREENE. 1921. American disease carrying larvae. In: Sanitary Entomology, Badger Pub. Co., Boston, 518 pp. (Key to larval *Anopheles*, p. 272.)

PURI, I. M. 1930. Synoptic tables for the identification of the full-grown larvae of the Indian anopheline mosquitoes. *Health Bull.* No. 16, 65 pp. Govt. India, Calcutta. (Paper not seen.)

ID. 1931. Larvae of anopheline mosquitoes with full descriptions of those of the Indian species. *Ind. Med. Res. Mem.*, Vol. 21, pp. 1-227, 47 pl. (Keys to full grown larvae, pp. 67-82.)

ID. 1935. Schematic tables for the identification of the Indian anopheles. Part I, adults. Part II, full grown larvae. *Rec. Malar Surv. Ind.*, Calcutta, 5: 265-268 and 269-273. (Key to full grown larvae.)

ID. 1935. Synoptic tables for the identification of the full-grown larvae of the Indian anopheline mosquitoes. *Health Bull. Delhi, No.* 16, 69 pp.

RODENWALT, E. 1928. Kaart en determineertable van de larven der Anophelinen van Ned. Ost. Indie. *Dienst. der Volksgezondheid, Batavia.* (Paper not seen.)

ROOT, F. M. 1922. The larvae of American Anopheles mosquitoes in relation to classification and identification. *Amer. Jour. Hygiene*, 2: 379-393.

Russell, P. F. 1925. Identification of larvae of three common anopheline mosquitoes of the southern United States. *Amer. Jour. Hygiene,* 5: 149-174. (Keys from Howard, Dyar and Knab, pp. 150-151.)

Seguy, M. E. 1923. Histoire naturelle des mostiques des France. Lechevalier, Paris, 225 pp., 205 figs. (Keys to larvae, p. 14.)

Smith, J. B. 1904. Mosquitoes occurring within the state, etc. *Rept. N. J. Agr. Exp. Sta.,* 1904, 482 pp. (Key to larvae, p. 154.)

Stanton, A. T. 1916. The larvae of Malayan Anopheles. *Bull. Ent. Res.,* 6: 159-172. (Key to mature larvae, p. 162.)

Stephens, J. W. W. and S. R. Christophers. 1908. The practical study of malaria. Univ. Press, Liverpool. (Characters of Anopheles eggs, p. 188, and tables of larvae, p. 202.)

Storey, G. 1919. Keys for the determination of Egyptian mosquitoes and their larvae. *Bull. Soc. Ent. Egypte,* Cairo, 1918 (1919), pp. 84-106.

Theodor, O. 1924. Pupae of some Palestinian culicines. *Bull. Ent. Res.,* 14: 341-345. (Key to species of pupae, p. 345.)

Wesche, W. 1910. On the larval and pupal stages of West African Culicidae. *Bull. Ent. Res.,* 1: 7-50. (Keys to larvae 16-18 and pupae pp. 18-19.)

CECIDOMYIIDAE.

Kieffer, J. J. 1913. Cecidomyiidae. *Genera Insectorum,* fasc. 152, pp. 7-13. (Summary of larval and pupal habits and characters of the family,—no key.)

Felt, E. P. The *Jour. Econ. Ent.,* Vol. 4, 1911, gives a host list of American gall midges, and the *Ann. Ent. Soc. Amer.,* Vol. 4, 1911, a summary of food habits. See also his key to American insect galls, *N. Y. State Mus. Bull.* 200, 1917.

STRATIOMYIIDAE.

Brauer, F. 1883. (See reference cited in general keys.)

Grünberg, K. 1910. (See reference in general keys.)

Johannsen, O. A. 1922. Stratiomyiid larvae and puparia of the northeastern states. *Jour. N. Y. Ent. Soc.* 30: 141-153. (Larval key, p. 142.)

Id. 1935. (See reference in general keys.)

Lenz, F. 1923. Stratiomyiden aus Quellen. Ein Beitrag zur Metamorphose der Stratiomyiden. *Archiv. Naturges,* Vol. 89, Abt. A. Heft 2, pp. 39-62. (Key to *Oxycera* species, pp. 46-47; to *Nemoletus,* p. 55, and *Beris,* pp. 58-59.)

Id. 1926. Stratiomyiden Larven aus dem Salzwasser. *Mitt.*

Geog. Ges., Lübeck, 31 : 170-175 (2nd series). (Key to species of *Oxycera*, pp. 173-174.)

LUNDBECK, W. 1907. Diptera Danica, Genera and Species of Flies Hitherto Found in Denmark. Part I. G. E. C. Gac, Copenhagen, 166 pp. (Key to several genera and species of Danish Stratomyiinae, pp. 74-75.)

SHARP, D. 1909. Stratiomyiidae and succeeding families of the Diptera Brachycera. In: *Verral, British Flies,* Vol. 5, Guerney and Jackson, London. (Key to genera of larvae, pp. 33-34.)

SEGUY, E. 1926. (See p. 18 of reference in general keys. This is Lundbeck's key cited above.)

(See also HART, 1905, p. 248, cited in general keys.)

TABANIDAE.

PHILIP, C. B. 1931. The Tabanidae (horseflies) of Minnesota, with special reference to their biologies and taxonomy. *Minn. Agr. Exp. Sta., Tech. Bul.* 80, 132 pp. (Various keys to eggs, larvae and pupae.)

STAMMER, H. J. 1924. Die Larven der Tabaniden. *Ztschr. Morph. und Ökol. Tiere.* 1 : 121-170. (Larval key to European genera, p. 130; to species of *Tabanus,* p. 132.)

SEGAL, G. 1936. Synopsis of the Tabanidae of New York, their biology and taxonomy, I. The genus *Chrysops.* Meigen. *Jour. N. Y. Ent. Soc.,* 44 : 51-78 and 125-154. (Key to eggs, larvae and pupae, p. 71; egg key is after Hart, 1895.)

STONE, A. 1930. The bionomics of some Tabanidae. *Ann. Ent. Soc. Amer.,* 23 : 261-304. (Generic key to eggs, larvae and pupa, p. 272; key to species of *Chrysops,* p. 273.)

(See also BELING, 1882; HART, 1895; MALLOCH, 1917; and JOHANNSEN, 1935; cited in general keys.)

RHAGIONIDAE (LEPTIDAE).

GREENE, C. T. 1926. Description of larvae and pupae of the two-winged flies belonging to the family Leptidae. *Proc. U. S. Nat'l. Mus.,* 70 : 1-20, 3 pls. (Key to larvae, pp. 2-3; pupae, pp. 3-4.)

(See also BELING, p. 236; cited in general keys.)

DOLICHOPODIDAE, EMPIDIDAE, ASILIDAE, BOMBYLIIDAE, and THEREVIDAE.

(See MALLOCH, 1915, in general keys, for key to pupae; and BELING, T., 1882; in general keys.)

SYRPHIDAE.

FLUKE, C. D. 1929. The known predaceous and parasitic enemies of the pea aphid in North America. *Wis. Agr. Exp.*

Sta., Bull. 93, pp. 1-47. (Key to larvae, pp. 15-17.)
(See also Beling, 1882; cited in general keys.)

Heiss, E. M. 1938. A classification of the larvae and puparia of the Syrphidae of Illinois, exclusive of aquatic forms. *Illinois Biol. Monog.*, 36: 1-142. (Key to genera of larvae and genera of puparia.)

Metcalf, C. L. 1913. Syrphidae of Ohio. *Ohio. Biol. Survey, Bull.* 1. *Ohio State Univ. Bull.*, Vol. 17 (31), pp. 1-122. (Key to larvae and pupae, p. 52.)

Id. 1916. Syrphidae of Maine. *Maine Agr. Exp. Sta., Bull.* 253, pp. 193-264. (Keys to larvae and pupae, pp. 256-258.)

Id. 1933. An obscure *Temnostoma* differentiated by its larval characters (Syrphidae: Diptera). *Ann. Ent. Soc. Amer.*, 26: 1-8. (A tabular larval key to two species of this genus, p. 5.)

Vimmer, A. 1933. [Keys to larvae and pupae of Czechoslovakian Syrphidae.] *Casopsis* (*Acta Soc. Ent. Czh.*), Vol. 30, pp. 181-187.

Conopidae.

Townsend, L. H. 1935. The mature larva and puparium of *Physocephala sagitarria* (Say) (Diptera, Conopidae), *Psyche*, 42: 142-148. (Larval key to three genera, p. 147.)

Trupaneidae (Trypetidae).

Greene, C. T. 1929. Characters of the larvae and pupae of certain fruit flies. *Jour. Agr. Res.*, 38: 489-504. (Key to larvae and pupae, pp. 490-491.)

Agromyzidae.

(See Frost, in general keys, pp. 37-38; and Needham, Frost and Tothill, p. 239.)

Myiasis Producing Diptera.

(Mostly Cyclorrhapha.)

Greene, C. T. 1921. Table to separate common larvae (maggots) Diptera. In: Pierce, Sanitary Entomology, Badger Publ. Co., Boston. (Larval key, pp. 142-144. This key also occurs in the Mimeographed edition of the U. S. Bur. Ent., Proceedings of the class to study entomology of disease, hygiene and sanitation, 1918, p. 217.)

Isaacs, I. M. 1923. Key to the identification of larvae of the dipterous families and certain subgroups . . . relating to myiasis. In: Herms, Medical and Veterinary Entomology, MacMillan Co., N. Y. (Larval key, p. 315.)

Laake, E. W., E. C. Cushing and H. E. Parish. 1936. Biology of the primary screw worm *Cochliomyia americana*

and a comparison of its stages with those of *C. macellaria. U. S. D. A., Tech. Bull.* 500. 24 pp. (Tabular differentiation of instars of these two species, pp. 13-14.)

PATTON, W. S. 1921. Notes on the myiasis-producing Diptera of man and animals. *Bull. Ent. Res.,* 12: 239-261. (Larval key, p. 258.)

ID. 1923. Identification of larvae of the Diptera which cause naso-pharyngeal and aural myiasis in man. *Jour. Laryn. and Otol.* 38: 18. (Paper not seen.)

RILEY, W. A. and O. A. JOHANNSEN. 1915. [Dipterous larva causing myiasis.] In: Handbook of Medical Entomology, Comstock Pub. Co., Ithaca, N. Y. (Key to larvae, pp. 136-137.)

ID. 1932. [Myiasis-producing Diptera.] (In: Medical Entomology, McGraw-Hill Co., New York.) (Larval key to families and some genera of aquatic dipterous larvae pp. 194-195 and myiasis-producing genera, based in part on Tao (1927) with keys to all instars pp. 370-376.)

TAO, S. M. 1927. A comparative study of the early larval stages of some common flies. *Amer. Jour. Hygiene,* 7: 735-761. (Larval key to families of first and second instars, pp. 746-747.)

MUSCIDAE, TACHINIDAE and METOPIDAE (= SARCOPHAGIDAE).

GREENE, C. T. 1921. An illustrated synopsis of the puparia of 100 muscoid flies (Diptera). *Proc. U. S. Nat. Mus.* 60: 1-39. (Mostly on Tachinidae.)

ID. 1925. A tentative arrangement of muscoid flies based on the puparia. *Proc. Ent. Soc. Wash.,* 27: 157-163. (A tabulation of characters and pictorial key, p. 10.)

ID. 1925. The puparia and larvae of sarcophagid flies. *Proc. U. S. Nat. Mus.,* 66: 1-26. (Larval key to five species and a long key to puparia.)

OESTRIDAE AND GASTROPHILIDAE.

DOVE, W. E. 1918. Some biological and control studies of *Gastrophilus haemorrhoidalis* and other bots of horses. *U. S. D. A., Bull.* 597, p. 1-51. (Key to larvae, p. 4.)

LUNDBECK, W. 1927. In: Diptera Danica. Vol. 7. G. E. C. Gad, Copenhagen, 558 pp. (Larval key to species of Gastrophilus, p. 79.)

PATTON, W. S. and F. W. CRAGG. 1913. A textbook of medical entomology. Christian Literature Soc. for India, etc. Calcutta, 768 pp. (This is Williston's key to genera of larvae, pp. 317-318.)

SHANNON, R. C. 1922. The bot flies of domestic animals.

Cornell Veterinarian, July 1922, pp. 240-262. (Larvae of horse bots, pp. 261-262.)

RODHAIN, J. et J. BEQUAERT. 1916. Materiaux pour une etude monographique des Dipteres parasites de l'Afrique. Part II. Revision des Oestrinae. *Bull. Scient. France et Belg.*, (7th Ser.) 50: 53-162. (Larval key to genera, pp. 67-68.)

WILLISTON, S. W. 1908. Manual of North American Diptera (3 ed.). Hathaway, New Haven, Conn. 405 pp. (Larval key to genera, p. 347.)

(See also BRAUER, 1883, pp. 36-38, and keys to myiasis- producing Diptera, such as those in RILEY AND JOHANNSEN, 1932.)

Anisoptera Schneider a Homonym (Neuroptera: Mantispidae).

The family Mantispidae is usually divided into a number of subfamilies by present workers and it is unfortunate that one of these is based on *Anisoptera* Schneider [1] which is a homonym of *Anisoptera* Berthold.[2] As a result, the former must be replaced and I propose *Platymantispa* as a new genus with *Mantispa notha* Erichson [=*Anisoptera notha* (Erichson)] as its genotype. Therefore, the portion of the family called the Anisopterinae by Enderlein [3] in his revision of the genera must now be known as the Platymantispinae.[4]

JOHN W. H. REHN, Philadelphia, Pennsylvania.

Mutant Body Colors in a Parasitic Wasp (Hym.: Braconidae).

Wild type individuals of the wasp, *Habrobracon juglandis* (Ashm.), vary from honey yellow to almost black, due primarily to temperature, higher producing more yellow, lower more black, but races under constant temperature may differ consistently in pigmentation. Dr. Anna R. Whiting describes and illustrates in color results of rearing wild and mutant body color types in Proceedings, American Philosophical Society, vol. 80, no. 1, Jan., 1939.

[1] 1843. Monograph Gen. Rhaphidia, p. 32.

[2] 1827. In Latreille, Fam. Thierr., p. 409.

[3] 1910. Stett, Ent. Zeit., 71, p. 342.

[4] *Mantispa notha* Erichson is the genotype of *Anisoptera* Schneider (by designation of Enderlein, 1910) and the genotype of *Platymantispa* (by present designation) and the two genera are as a consequence isogenotypic.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part. heft, &c., the latter within ( )follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—**Allen, N.**—Some applications of mathematics to an insect life-history study. [12] 31:719-722, ill. **Anslijn, N., Nicolaas.**—Obituary by D. MacGillavry. [58] 10:87-88. **Barnes, H. F.**—Recent advances in Science: Entomology. [Science Progress] 33:549-556. **Creighton, J. T.**—Factors influencing insect abundance. [12] 31:735-739. **Curran, C. H.**—On eating insects. [Natural History, N. Y.] 43:84-89. **Daniels, J.**—The dedication of Mexico's Leland Ossian Howard Entomological Laboratory. [12] 31:773-775. **Darlington, P. J.**—Experiments on mimicry in Cuba, with suggestions for future study. [36] 87:681-708, ill. **Derenne, F.**—Professeur Dr. Embrik Strand: Volumes jubulaires III et IV. [Lambillionea] 1938:198-200. **Felt, E. P.**—The literature of American Economic Entomology. [12] 31:353-356. Wind drift and dissemination of insects. [4] 70:221-224. **Flint & Bigger.**—Biological control of insects through plant resistance. [4] 70:244-246. **Gaines & Ewing.**—The relation of wind currents, as indicated by balloon drifts, to cotton flea hopper dispersal. [12] 31:674-677, ill. **Ginsburg, I.**—Arithmetical definition of the species, subspecies and race concept, with a proposal for a modified nomenclature. [Zoologica] 23:253-286, ill. **Harris, K. L.**—Soil conservation versus insect control. [10] 41:20-26. **Hayes & DeCoursey.**—(See Orthoptera.) **Heberdey, R. F.**—Das Herstellen mikropischer Praparate. [79] 24:224-233, ill. **Kennedy, C. H.**—The present status of work on the

ecology of aquatic insects as shown by the work on the Odonata. [43] 38: 267-276. **Miller, H.**—The genus and species in relation to evolution and to system. [90] 73: 93-95. **Patch, E. M.**—Tour to the Entomological Congress [12] 31: 775-777. **Rodeck, H. G.**—Type specimens of fossils in the University of Colorado Museum. [Univ. Col. Studies] 25: 281-304. **Ronna, A.**—Animaes inimigos da Abelha domestica e de seus procuctos. [Rev. D.N.P.A., Rio de Janeiro] 1937: 1-39, ill. **Strong, L. A.**—What is entomology? [Smiths. Report] Publ. 3467: 377-383, ill. **Weber, H.**—Grundriss der Insektenkunde. Jena, Gustav Fischer, xii + 258 pp., ill.

ANATOMY, PHYSIOLOGY, ETC.—Ander, K.—Eine neue auffassung uber die tracheisation des insektenflugels. [Opuscula Ent.] 3: 83-90, ill. **Beadle, Tatum & Clancy.**—Food level in relation to rate of development and eye pigmentation in Drosophila melanogaster. [92] 75: 447-462. **Brightwell, S. T. B.**—A method for investigating membrane permeability. [22] 29: 391-403, ill. **Brindley, M. D.**—The metathoracic postcoxal bridge of Heteroptera. [107] A, 13: 103-106, ill. **Bruce, W. G.**—Soil moisture and its relation to the mortality of Hypoderma pupae. [12] 31: 639-642, ill. **Bryk, F.**—Combinaison du doublement des ailes avec formation d'ailes jumelles chez Perisomena (Lep. Saturniid.). [Lambillionea] 1939: 5-7, ill. **Chaboussou, F.**—Un cas de coaptation sexuelle chex Lebia grandis. [Rev. Francaise d'Ent.] 5: 57-64, ill. **Cockayne, E. A.**—Supernumerary antennae in insects. [36] 87: 385-396, ill. **Crowson, R. A.**—The metendosternite in Coleoptera: a comparative study. [36] 397-416, ill. **Deonier, C. C.**—Effects of some common poisons in sucrose solutions on the chemoreceptors of the housefly, Musca domestica. [12] 31: 742-745. **Evans, A. C.**—Studies on the distribution of nitrogen in insects. II.—A note on the estimation and some properties of insect cuticle. [107] A, 13: 107-110. **Favrelle, M.**—Etude du Phalces longiscaphus (Orth.: Phasmid.). [24] 107: 197-211, ill. **Fraenkel, G.**—The evagination of the head in the pupae of Cyclorraphous flies. [107] A, 13: 137-139, ill. **Fraenkel & Harrison.**—Irregular abdomina in Calliphora erythrocephala (Dipt.). [107] A, 13: 95-96, ill. **Greenshields, F.**—Whiting's Hypothesis and Pteromalus; a critique of Dozovcera's (1936) study. [90] 73: 89-91. **Harris, C. S.**—The anatomy and histology of the alimentary system of the harlequin cab-

bage bug, Murgantia histrionica (Pentatom.). [43] 38:316-331, ill. **Hawkins, C. N.**—Insect Teratology. [107] A, 13: 92-94, ill. **Jannone, G.**—Osservazioni sulla presenza, struttura e funzione d'una vesicola ghiandolare confinata nel protorace delle specie mediterranee del gen. Acrotylus, con particolare riguardo all'A. insubricus (Orth. Acridioid.). [R. Lab. Ent. Agrar. Portici] 1938:41-62, ill. **Khouvine, Ephrussi & Chevais.**—Development of eye-colors in Drosophila: nature of the diffusible substance; effects of yeast, peptones and starvation on their production. [92] 75:425-446. **Koch, A.**—Symbiosenstudien, III: Die intrazelluare Bakterien-Symbiose von Mastotermes darwiniensis (Isoptera). [46] 34:584-609, ill. **Korner & Zarapkin.**—Uber Gerichtete Variabilitat, VIII: Die Farbungsvariation bei Bombus lapponicus F.-weinchen. [46] 34:739-752, ill. **Krause, G.**—Die Ausbildung der Korpergrundgestalt im Ei der Gewachshausschrecke, Tachycines asynamorus. [46] 34:499-564, ill. **Lawson, C. A.**—Order of differentiation in relation to order of determination in gamic female Aphids (Homoptera). [90] 73:69-82, ill. **Lucchese, E.**—Contributo alla conoscenza della Leskia aurea (Dipt. Larvaevorid: Dexiinae). [R. Lab. Ent. Agrar., Portici] 1938:39 pp., ill. **Mather & Dobzhansky.**—Morphological differences between the "races" of Drosophila pseudoobscura (Diptera). [90] 73:5-25. **Maulik, S.**—The correlation between colour pattern and structure in insects. [75] 3:230-235, ill. **Potter, E.**—The internal anatomy of the larvae of Panorpa and Boreus (Mecoptera). [107] A, 13:117-130, ill. The internal anatomy of the order Mecoptera. [36] 87:467-502, ill. **Pradhan, S.**—Glands in the head capsule of Coccinellid beetles with a discussion of some gnathal glands. [J. Morph.] 64:47-66, ill. **Roonwal, M. L.**—On a new law of the Bitriangular medial concentration of the cephalic appendages in the Chilopoda and the Insecta. [J. Morph.] 64:1-8, ill. **Slifer & Uvarov.**—Brunner's organ: A structure found on the jumping legs of grasshoppers (Orthopt.). [107] A, 13: 111-115, ill. **Smith, S. G.**—Thelytokous parthenogenesis in Cephus cinctus (Hymen.): a criticism. [4] 70:259-260. **Zarapkin, S. R.**—Ueber Gerichtete Variabilitat bei Coccinelliden. V. Die Reihenfolge der Fleckentstehung auf den Elytren der Coccinella 10-punctata in der Ontogenetischen Entwicklung. VI: Biometrische analyse der Gerichteten Variabilitat. [46] 34:565-572; 573-584, ill. **Zeller, H.**—Blutt und Fettkorper im Flugel der Mehlmotte, Ephestia kuhniella. [46] 34:663-738, ill.

ARACHNIDA AND MYRIOPODA.—**Allen, W. E.**—Observations concerning ticks. [Turtox News] 17:9-10. **Bondar, G.**—See under Coleoptera. **Jacot, A. P.**—The Geenton mites of Florida (Grossman Collection—III). [39] 21:49-57, ill., (k*). **Kaston, B. J.**—Notes on a new variety of Black Widow spider from southern Florida. [39] 21: 60-61. **Keifer, H. H.**—Eriophyid Studies II. [Bull. Dept. Agric. of California] 27:301-323, ill. Eriophyid Studies III. [Bull. Dept. Agric. of California] 28:22 pp., ill. **de Mello-Leitao, C.**—Solifugos de Argentina. [Mus. Arg. Cien. Nat.] 40:32 pp., ill. (Sk*). **Roewer, C. T.**—Opiliones aus dem Naturhistorischen museum in Stockholm. [83] 30, (B 10): 1-8. **Savory, T. H.**—Notes on the biology of harvestmen. [J. Quekett Micro. Cl.] 1:89-94.

THE SMALLER ORDERS OF INSECTS,—**Banks, N.**—New West Indian Neuropteroid insects [105] 9:285-304, ill. **Borror, D. J.**—Additions to the Ohio list of Dragonflies (Odonata). [43] 38:307-310. **Eastham, H.**—Movement of the gills of Ephemerid nymphs in relation to the water currents produced by them. [J. Quekett Micro. Cl.] 1:95-99. **Fraser, E. C.**—A note on the polymorphic venation of Epiophlebia superstes (Odonata) and its phylogenetic importance. [107] A, 13:155-157, ill. **Hood, J. D.**—Studies in Neotropical Thysanoptera, VIII. [105] 9:404-426 (*). **Kennedy, C. H.**—Odonata, see under General. **Lestage, J. A.**—Etudes sur la biologie des Plecopteres, Remarques critiques sur le genre Taeniopteryx (olim Nephelopteryx) et sur la differenciation des larves connues en Europe. [33] 73:439-452, ill. **Moulton, D.**—Thysanoptera from Minas Geraes, Brazil. [105] 9:374-382, (*). **Spieth, H. T.**—Taxonomic studies on Ephemerida, I: Description of new North American spp. [40] no. 1002; 11 p., ill.

ORTHOPTERA.—**Favrelle, M.**—See under Anatomy. **Folsom & Woke.**—The field cricket in relation to the cotton plant in Louisiana. [U. S. Dept. Agric.] Tech. Bull. 642: 28 pp., ill. **Hayes & DeCoursey.**—Observations of grasshopper parasitism in 1937. [12] 31:519-522. **Rehn, J. W. H.**—Notes on the genus Haaniella with the description of a new species (Phasmatidae). [1] 64:367-371, ill. **Slifer & Uvarov.**—See under Anatomy.

HEMIPTERA.—**Beamer, R. H.**—Four n. spp. of Leafhoppers and notes on two others (Cicadell.). [103] 12:26-30. Miscellaneous leafhoppers with descriptions of five n.

spp. (Cicadell.). [4] 70:224-230, ill. **Butler, C. G.**—A further contribution to the ecology of Aleurodes brassicae. [107] A, 13:161-172. **Caldwell, J. S.**—New Texan Fulgoridae. [43] 38:304-306. **DeLong, D. M.**—Some n. spp. of Parabolocratus (Cicadell.). [43] 38:301-303. The genus Phlepsius, a study of the North American spp. with special reference to the characters of the male genitalia (Cicadell.). [Lloydia] 1:232-252, ill. (k*). Biological studies on the leafhopper Empoasca fabae as a bean pest. [U. S. Dept. Agric.] Tech. Bull. 618:60 pp., ill. **Essig, E. O.**—Some new and little known Aphididae of California. [12] 31:780-781. **Ferris, G. F.**—Contributions to the knowledge of the Coccoidea, VIII. Illustrations of thirteen genotypes of the Diaspididae. [Microent.] 3:57-75, ill. Atlas of the scale insects of North America. Stanford Univ. Press. California. 1938. **Jordan & Wendt.**—Zur Biologie von Salda litoralis. [60] 99:273-292, ill. **Morrison, H.**—Descriptions of n. spp. of Matsucoccus (Coccid.). [10] 41:1-20.

LEPIDOPTERA.—Ainslie, C. N.—Flight of Alabama argillacea. [12] 31:779. **Dethier, V. G.**—Notes on the early stages of some Hesperiinae. [4] 70:255-259. **Dos Passos, C. F.**—A n. race of Basilarchia archippus from Louisiana (Nymphal.). [4] 70:243, ill. **Dow, R.**—A new New Englander (Asterocampa celtis). [New England Nat.] no. 1: 16, ill. **Freeman, T. N.**—A n. race of Incisalia niphon, with notes on Strymon acadica (Lycaen.). [4] 70:246-248. **Gaede, M.**—Lepidopterorum Catalogus. Pars. 88. Oecophoridae. 208 pp. **Hardy, J. E.**—Plutella maculipennis, its natural and biological control in England (Tineid.). [22] 29:343-372, ill. **Hartig, G. F.**—Sechs neue Mikrolepidopteren. [64] 23:88-90, ill. (S). **Hayward, K. J.**—A n. gen. & several n. spp. of Neotropical Hesperiidae. [105] 9:370-374, ill. **Holik, O.**—J. Chr. Fabricius: Systema Glossatarum. [Lambillionea] 1938:188-189. **McDunnough, J.**—Some apparently new Texan Euphithecias. [4] 70:236-242, ill. **Sachse, W.**—Melanism. [Ward's Ent. Bull.] 6:1. **Stichel, H.**—Lepidopterorum Catalogus. Pars 86. Nymphalidae I: subfam. Dioninae, Anetiinae, Apaturinae. 374 pp. **Watson, J. R.**—A remarkable flight of butterflies. [39] 21:62. **Zikan, J. F.**—Novos Lepidopteros brasileiros da familia Hesperidae. [105] 9:321-336, ill.

DIPTERA.—Alexander, C. P.—New or little known Tipulidae, LVI: Neotropical spp. [75] 3:186-209. Records and descriptions of Tipulidae from tropical America. Pt. 1.

[105] 9:426-441, (*). **Bequaert, J.**—Notes on Hippoboscidae. 12: The gen. Microlynchia. [105] 9:343-349, ill. (Sk*). **Cresson, E. T., Jr.**—The Neriidae and Micropezidae of America north of Mexico. [1] 64:293-366, ill. (k*). **Cushing & Parish.**—Seasonal variation in the abundance of Cochliomyia spp., Phormia spp., and other flies in Menard Co., Tex. [12] 31:764-769. **Goddard, W. H.**—The description of the puparia of fourteen British species of Sphaeroceridae (Borboridae). [Trans. Soc. Brit. Ent.] 5:235-258, ill. (S). **Hardy, D. E.**—New Nearctic Pipunculidae. [103] 12:16-25, ill., (k). **James, M. T.**—Studies in Neotropical Stratiomyiidae. [103] 12:32-36, (k*). **Komp, W. H. W.**—Aedes leucotaeniatus, a n. sp. of Aedes allied to A. leucocelaenus; and descriptions of the male and larva of A. leucocelaenus (Culicid.). [10] 40:260-266, ill. **Komp & Kumm.**—A n. sp. of Haemagogus, mesodentatus, from Costa Rica, and a description of the larva of H. anastasionis (Culicid.). [10] 40:253-259, ill. **Mather & Dobzhansky.**—See under Anatomy. **Pinto & Almeida.**—Hypopygio normal e anomalo de Aedes (Culicelsa) taeniorhynchus (Culic.). [105] 9:282-284, ill. (S). **Ronna, A.**—Melaloncha ronnai (Phoridae) endoparasita de Apis mellifica (Abelha domestica). [Rev. D.N.P.A., Rio de Janeiro] 1937: 16 pp., ill. **Shields, S. E.**—Tennessee Valley Mosquito Collections. [12] 31:426-430. **Townsend, C. H. T.**—Manual of Myiology. Part VII. Sao Paulo, Brasil. 1938. 428 pp.

COLEOPTERA.—Benick, L.—Die Steninen Mittelamerikas (Staph.). [Mitt. Munchner Ent. Ges.] 28:247-281, (k*). **Bondar, G.**—Notas entomologicas da Bahia, III. (Acarina & Cerambycidae). [105] 9:441-449, ill. (*). **Borchmann, F.**—Neue Alleculiden aus dem Museum der Stadt Stettin. [60] 99:292-298, (Sk*). **Chaboussou F.**—(See Anat. & Phys.) **Cros, A.**—Considerations generales sur le genre Epicauta. Etude biologique sur epicauta albovittata (Meloidae). [Mem. Soc. Ent. Ital.] 16:129-144, ill. **Dahms & Kagan.**—Egg predator of the Chinch bug, Collops quadrimaculatus. [12] 31:779-780. **Darlington, P. J.**—See under General. **Denier, P.**—Notes sur quelques Meloidae du Bresil. [105] 9:336-343, ill. **Fisher, W. S.**—A new Anobiid beetle from Oregon. [10] 41:26-27. **Gebien, H.**—Katalog der Tenebrioniden. [Mitt. Munchner Ent. Ges.] 28:49-80; 283-314; 397-428. **Helfer, J. R.**—On mounting Staphylinidae. [Ward's Ent. Bull.] 6:4. **Hustache, A.**—Coleopterorum Catalogus. Pars 163. Curculionidae: Barinae. 219 pp. **Kaston & Riggs.**—On certain habits of elm bark beetles. [12] 31:467-469, ill. **Lesne, P.**

—Coleopterorum Catalogus. Pars 161. Bostrychidae. 84 pp. Sur un Nitidulide Mycetophage nouveau et sur quelques caracteres de la famille. [Rev. Francaise d'Ent.] 5: 158-168, ill. **Liebke, M.**—Miscellanea Carabidologica Americana, Pars III. [105] 9: 396-403, ill., (S*). **Lona, C.**—Coleopterorum Catalogus. Pars 162. Curculionidae: Otiorrhynchinae III. 415-600. **D'Orchymont, A.**—Contribution a l'etude des Palpicornia, XII. [33] 78: 426-438. (S*). **Paulian, R.**—Contribution a l'etude des Canthonides Americains (Lamellic.). [24] 107: 213-296, ill. (Sk*). **Pechuman, L. L.**—A preliminary study of the biology of Scolytus sulcatus. [12] 31: 537-543, ill. **Sanderson, M. W.**—A n. gen. of Scarabaeidae with descriptions and notes on Phyllophaga. [103] 12: 1-15, ill., (*). **Spaeth, F.**—Die gattung Himatidium (Cassidinae). [105] 9: 305-317, (Sk*). **Uhmann, E.**—Hispinen aus Argentinen (Chrysomel.). [105] 9: 364-370, ill. (*). **Wenzel, R. L.**—New and little known Neotropical Hetaeriomorphini (Histeridae). [105] 9: 317-321, ill. **Zarapkin, S. R.**—See under Anatomy.

HYMENOPTERA.—**Benson, R. A.**—On the classification of sawflies (Symphyta). [36] 87: 353-384, ill., (k*). **Dow & Hammerstrom.**—Honeybee facts. [New England Nat.] no. 1: 7-10, ill. **Kennedy, C. H.**—Solenopsis rosella, a new ant from southern Ontario. [4] 70: 232-236, ill. **Korner & Zarapkin.**—See under Anatomy. **Mickel, C. E.**—The neotropical Mutillid wasps of the genus Timulla. [36] 87: 529-680, ill., (k*). The Neotropical wasps of the genus Dimorphomutilla. [105] 9: 349-364, (k*). **Muesebeck, C. F. W.**—The gen. Dendrosoter in the United States (Bracon). [10] 40: 281-287, ill. (k*). **Ogloblin, A. A.**—Descripciones de Bethylidae y Dryinidae de las colecciones del Museo Argentino de Ciencias Naturales. [An. Mus. Arg. Cien. Nat.] 40: 35-48, ill. (*S). **Scullen, H. A.**—A review of the gen. Eucerceris (Sphecidae). [Oregon St. Monogr., Stud. in Ent.] no. 1, 80 pp., ill., (k*). **Takeuchi, K.**—A systematic study of the suborder Symphyta (Hymenoptera) of the Japanese Empire (1). [Tenthredo] 2: 173-229, ill., (k*). **Townes, H. K.**—The Nearctic spp. of Netelia (Paniscus of Authors) and a revision of the genera of the Neteliini (Ichneumon.). [Lloydia] 1: 168-263, ill., (k*). Pammegischia and Trichofoenus discarded (Aulacoid Hymen.). [4] 70: 254-255. **Travis, B. V.**—The fire ant (Solenopsis spp.) as a pest of quail. [12] 31: 649-652. **Walley, G. S.**—Notes on the genus Protarchoides (Ichneumon.). [4] 70: 230-232, (k*).

OBITUARY

B. PRESTON CLARK, a Research Associate in the Department of Insects of the Academy of Natural Sciences of Philadelphia, who died January 11, 1939, was born in Boston, October 8, 1860, and graduated from Amherst College in 1881. With an early bent for zoological study, the assumption of business responsibilities compelled him to devote most of his life to a variety of mining, smelting and manufacturing interests. However, during an exceedingly active life in these lines he was able to form the most outstanding collection of the Sphingidae, or hawk-moths, in existence, which in recent years was given to the Carnegie Museum at Pittsburgh. A Life Member of the Academy since 1917, Dr. Clark showed his interest in our institution by building up our collection of hawk-moths to the point where the number of species represented here was exceeded only by that in the collection given by him to the Carnegie Museum, placing us in as representative a position in this respect as any collection in Europe. In the last few years he further assisted the Academy by having his sphingid collectors in various parts of the world collect Orthoptera for our series.

Dr. Clark issued many important studies on the Sphingidae and by his own researches greatly broadened our knowledge of the group.

He was Consul for Haiti at Boston for many years, and also President of the Cambridge Theological Seminary, a trustee of the Massachusetts Homeopathic Hospital and Treasurer of the Massachusetts Bible Society, the Lincoln Home Association and the Newsboys' Reading Room Association.

JAMES A. G. REHN.

DR. WILTON EVERETT BRITTON, national authority on entomological subjects and State entomologist for Connecticut since 1901, died February 15, 1939, in a hospital at New Haven, Connecticut. He was born at Marlboro, Massachusetts, September 18, 1868, was graduated from the University of New Hampshire in 1893 and took a year of graduate work at Cornell. Yale gave him the degree of Ph.D. in 1903, and New Hampshire the honorary Sc.D. in 1930. It was largely through Dr. Britton's efforts that Connecticut's shores were converted from mosquito-infested marshes into pleasant resorts.

He was the editor of a series on the Insects of Connecticut written by specialists, of which the volumes on Orthoptera, Odonata, Hemiptera and Hymenoptera have appeared. Active in the national entomological societies, he was President of the Association of Economic Entomologists in 1909.

ENTOMOLOGICAL NEWS

Vol. L. APRIL, 1939 No. 4

On the Dimorphism of Cocoons of Sphecophaga burra (Cresson). (Hymenoptera: Ichneumonidae).

By Rudolf G. Schmieder, Zoological Laboratory, University of Pennsylvania.

The ichneumonid parasites that inhabit the nests of hornets and yellow-jackets have attracted considerable attention. In 1828, Curtis described the habits of the European species, *Sphecophaga vesparum* (Curtis), and discussed the problem of the succession of its generations through the year. Since that time this problem has been dealt with by a number of authors, English, German, and French, without, however, receiving a satisfactory solution.

The common American species, *S. burra* (Cresson), has not had so many observers, although it presents the same problems that the European species does. In addition, my own observations show that it exhibits a very striking and very puzzling phenomenon, not recorded for the European species,—the production of two kinds of individuals, morphologically alike but differing from each other in the length of their life history and in the type of cocoon that they spin. It is the purpose of the present paper to call attention to the interesting problem presented by the existence of these two kinds of individuals and to record the data which I have gathered in order that others who may come upon parasitized hornets' nests will, it is hoped, be able to make additional observations and perhaps find a solution for questions here left unanswered.

Securing Nests.

In securing nests of hornets and wasps, I observed certain precautions in order to avoid being stung too badly. I used a bee-veil to protect my face, and tied shut my sleeves and trouser legs. After approaching the nest as quietly as possible, I quickly plugged the nest entrance with a wad of absorbent cot-

ton and poured a generous quantity of chloroform over the nest. The chloroform acted upon those hornets that were still in the nest so that the numbers of the defending host did not become too great. Then I enclosed the nest as quickly as possible in a large sheet of mosquito netting and detached it from its support. At the laboratory, I placed the nests in a large can and etherized the inhabitants, then tore the nest apart, and transferred its contents to a wire insect-breeding cage. (If left too long in the mosquito netting, the hornets chew their way out through the cloth.) The exposures to chloroform and ether do not kill the hornets, their brood, or their parasites. Some nests I secured at night, when, employing the same procedure, I sometimes entirely avoided being stung.

Observations.

Sphecophaga was first encountered in two nests of the white-faced hornet, *Vespa maculata* Linn., taken at West Manayunk, Pennsylvania, September 10, 1922. These nests contained probably fifty to sixty parasites, but no actual record of the number of individuals was made. I did prepare a crude pen sketch to show what I found to be the typical condition of a parasitized hornet's cell with its two very distinct types of parasite cocoons, and I wrote out brief notes on the relative positions of these cocoons within the cell, as well as a description of the cocoons themselves. The series of specimens that I sent to the Bureau of Entomology and that Mr. R. A. Cushman kindly determined were from these nests; they are referred to in a paper by Mr. Cushman (1933). Of other nests secured during the succeeding winter and spring, those that contained parasites were: One from the same locality as above, taken December 27, 1922, and one from Cobb's Creek, Pennsylvania, May 4, 1923. In the years following, additional hornets' and yellow-jackets' nests were secured but not until 1935 was *Sphecophaga* again found. In that year, two *Vespa maculata* nests, taken at Media, Pennsylvania, contained together the small number of five parasitized cells, which yielded only eleven cocoons.

In the Cobb's Creek nest were found several *Sphecophaga*

cocoons from which secondary parasites emerged which were kindly determined by Mr. A. B. Gahan as the chalcid *Dimmockia incongrua* (Ashm.). I reared many successive generations of this chalcid upon larvae of mud-dauber wasps but found no features of unusual interest in its life history.

In the yellow-jacket nests taken, I have not found parasites of any kind, although *S. burra* has been recorded (Zabriskie, 1894) from *"Vespa germanica,"* no doubt *V. maculifrons* Buy, and the European species is also common in the nests of a number of different species of *Vespa,* including the hornet *V. crabro* as well as the smaller yellow-jackets (Reichert 1911, Schmiedeknecht 1914).

Upon examining the combs of the large and prosperous nests taken in September, I found the paper-cells of the larger combs occupied in part by larvae and in part by the cocoon-enclosed pupae of drones and queens. In the cells containing the hornet larvae no parasites were observed; nor did any appear in the course of the next five or six days. During this time, the larvae continued to live, but they gradually diminished in size as the result of the now completely one-sided trophallaxis from which the adults that were confined with them alone benefitted. This observation does not, however, exclude the possibility that some of these larvae may have contained young endoparasitic stages of *Sphecophaga.* Morley (1900) states that in *S. vesparum* the female oviposits in the body of the hornet larva, that the young parasite larvae feed upon the fat-body of the host without interfering with its development, and that, not until later, after the host has spun its cocoon and has pupated, do the parasites begin to feed externally upon that host pupa.

Only within the cells containing the pupae of hornets were the larvae and pupae of the parasite *S. burra* encountered. The cells containing parasites were scattered among the unparasitized cells and there seemed to be no way of distinguishing them externally. It was necessary to cut off the tops of the hornet cocoons and to expose the pupae. If the then exposed head of a pupa lacked the normal opaque white color and was translucent and watery in appearance, one could be sure that

pulling this pupa out of the cell would reveal the presence of a number of *Sphecophaga* larvae or cocoons in the bottom of the hornet cell. If only one parasite were present, the hornet pupa was still almost normal in size and appearance. If, however, six or seven parasites had fed on the hornet pupa, then only the head and anterior part of the thorax had retained their normal shape, while the rest of the host pupa was very much shrunken and tapered, although still appearing fresh and clean.

The number of parasites present in a cell varied from one to seven; the average number was three. For the most part the parasites were already enclosed in their cocoons, and these cocoons, it was immediately evident, were of two totally different kinds. The one sort was tough, parchment-like, light brown or yellowish brown in color and firmly attached to the sides and bases of the host cells. The other was quite delicate, white in color, and loosely attached to the sides of the cells. These two kinds of cocoons are so different that Zabriskie (1894), who found them in *Vespa* nests from New Baltimore, New York, and described them very accurately, believed that they represented two different species of parasites. That author also correctly observed that the tough brown cocoons are always in the very base of the cells and that, when such cells are cleaned out by the wasps, the cocoons of the parasite are not removed but are allowed to remain as the base of the cell.

In the large queen cells of *Vespa maculata* nests, three or four vertically placed brown cocoons often filled the bases of the cells just distal to the excrement discharged by the host larvae. If only a single brown cocoon is present, it also is placed vertically but occupies only one angle of the cell. All these brown cocoons contained larvae; some were still spinning, others were already in diapause. From such cocoons no imagines emerged until the folllowing April. There is no doubt but that these brown cocoons represent the typical form of *Sphecophaga* cocoon, not only because they are twice as numerous as the other form but also because they are entirely like those that have been described and figured (Reichert 1911) for the European *S. vesparum*.

The second form of cocoon does not in any way resemble the typical form but is a delicate structure of white silk with a fluffy texture quite different from that of the brown cocoons. Furthermore, these white cocoons are loosely attached anywhere upon the inner walls of the hornet cell. The larvae in the white cocoons undergo transformation immediately they have finished spinning and emerge as adults about one week later. They never enter into the long diapause characteristic of the larvae in the brown cocoons.

In the first nest from which counts were made of cocoons, the nest from West Manayunk, twenty-three parasitized hornet cells were found and these yielded altogether fifty-one brown and eighteen white cocoons, as shown in the accompanying table. This table also gives the records from the other nests.

Locality of nest	No. of cells in nest	No. of brown cocoons	No. of white cocoons
W. Manayunk	23	51	18
Cobb's Creek	26	41	25
Media (a)	2	5	2
Media (b)	3	2	2
Total	54	99	47

Among the cells examined there were thirty-three that contained only brown cocoons, from one to four per cell. In sixteen cells out of the total of fifty-four, both brown and white cocoons were present in the same cell. In such cells it was usual to find two or three brown cocoons firmly attached to the sides and base of the cell, while two or three white cocoons occupied the space between the brown cocoons and the remains of the host pupa. Rarely only white cocoons, numbering from one to five, are present in a cell to the exclusion of brown ones. This condition was seen in three cells of the Cobb's Creek nest, and in two from a Media nest, but was never encountered in the West Manayunk nest.

Since the white cocoons are nearly always found only in the same cells with brown cocoons, and since in all the nests examined only a small percentage of the host pupae were parasitized, it is necessary to conclude that the same mother may

produce both kinds of offspring. Even in the nest designated in the table as "Media (a)," in which only two cells of a large and prosperous hornets' nest were parasitized, these cells contained both brown and white cocoons. It is unlikely that two different females would oviposit in the same two cells out of hundreds of possible cells.

From the position of the *Sphecophaga* larvae in the host cell and from the appearance and the position of the remains of the host, it is evident that the parasites feed only at the posterior end of the host and, furthermore, that those larvae that spin the brown cocoons must have completed their feeding and begun spinning earlier than those that produce the white cocoons.

The imagines obtained from the two kinds of cocoons were identical in appearance except that, to quote from a letter from Mr. Cushman to whom I had sent a series for determination: "The fall-emerging specimens [from white cocoons] appear to be consistently stouter than those emerging in the spring [from brown cocoons]. . . ." All adults which I obtained were females and the species is, like the European one, evidently thelytokous. Males are extremely rare.

From the data that have been presented it is clear that there are two kinds of individuals of *S. burra:* Those that spin brown cocoons and undergo a long larval diapause, and those that spin white cocoons and transform without a diapause. It is also evident that these two forms are not representatives of different generations but that they are really individuals of the same generation and occur as offspring of the same mother.

Literature Cited.

Curtis, John. 1828. British Entomology; being illustrations and descriptions of the genera of Insects found in Great Britain and Ireland. Printed for the author by Richard Taylor, London. Volume 5; col. pl. 198, 198, *Anomalon vesparum.*

Cushman, R. A. 1933. Notes on *Sphecophaga burra* (Cresson), an ichneumonid parasite of *Vespula maculata* (L.). (Hymenoptera). Proc. Ent. Soc. Washington 35: 10-11.

Morley, Claude. 1900. On Sphegophaga vesparum, Curt. Ent. Monthly Mag. 36: 117-124.

Reichert, Alex. 1911. *Sphecophaga vesparum* Rtzb., eine Schlupfwespe im Wespenneste. Ent. Jahrbuch, Leipzig, 20: 180-182, 1 pl.

Schmiedeknecht, O. 1914. Opuscula Ichneumonologica. Fasc. 36, p. 2823-24.

Zabriskie, J. L. 1894. Notes on some parasites of *Vespa*. Jour. N. Y. Ent. Soc. 2: 81-86. 1 pl.

Two New Species of Agromyza from South America (Dipt.: Agromyzidae).

By S. W. Frost, The Pennsylvania State College.

Agromyza braziliensis n. sp.

A large species, 4.5 to 5 mm.

♂: Front, face, cheeks, palpi, antennae, scutellum, halteres and legs largely pale yellow. Margin and fringe of calypteres dark brown.

Front and orbits concolorous pale yellow, front together with orbits about as wide as either eye, sides parallel; four pairs of strong fronto-orbital bristles, lower three pairs approximated in their rows, the upper bristles more widely separated, the lower two pairs pointing inward, the other two pairs pointing upward, a few minute hairs on the upper outer angles of the orbits next to the eye margin; frontal lunule not conspicuous; bases of antennae approximated; cheeks yellow more than one-half the eye-height, narrower in front than behind; a strong pair of oral vibrissae accompanied by about six bristles along the lower edge of the cheek; proboscis and palpi yellow, setae on the palpi black, those on the proboscis yellow; antennae entirely yellow, third segment small and rounded, second segment with a short dorsal bristle, arista black, almost bare, distinctly swollen on the basal fifth and about four times the length of the third antennal segment; occiput pale yellow on the sides, brown above towards the middle, ocellar triangle small, shiny brown continuous with the color of the occiput, ocellar bristles long extending to the frontal lunule.

Mesonotum sub-shiny black with a large yellow spot on the posterior margin, the anterior margin of this spot prolonged

into a point reaching nearly to the middle of the mesonotum, the black color narrowed on the fore part of the mesonotum so that the presutural bristles are located on the edge of this colored area; scutellum broadly yellow in the middle and below, darkened along the sides; pleura largely yellow, the yellow extending above the base of the wings and including the anterior humeral callosities, the sternopleura bears a large triangular black spot leaving a narrow yellow band across the upper portion, the mesopleura bears a narrow, darkened, transverse band below, the pteropleura has a small, darkened, triangular spot; there is also a small, darkened spot in front of the base of the wing, and a small spot above the suture of the mesopleura; there are four well-developed pairs of dorsocentral bristles, four irregular rows of acrostichals reaching from the anterior to the posterior margin of the mesonotum; two pairs of presutural bristles, outer pair large, inner pair smaller; one strong sternopleural bristle accompanied by numerous smaller setae, 1 strong mesopleural bristle with numerous smaller setae along the upper margin of the mesopleura, humeral bristle strong accompanied by numerous smaller bristles.

Legs largely yellow, coxae and femora entirely yellow, tibia and tarsi slightly darkened, a distinct posterior bristle near the middle of the mid tibia.

Abdomen brown above, yellow on sides and below, incisures minutely and indistinctly yellow, genetalia subshiny brown.

Wings hyaline, slightly smoky, veins brown, base of costa and first vein to and slightly beyond the humeral cross-vein, yellow, fifth vein slightly stronger, auxillary vein faint but separate from first vein and ending separately in the costa, costa extending to the fourth vein, two strong setae on base of the costa, anterior cross-vein at about the end of the first vein and near the middle of the discal cell, veins two and three diverging slightly at their tips, veins three and four nearly parallel at their tips, vein four terminating near the tip of the wing, distal section of the fifth vein about one-and-a-quarter times the length of the penultimate section; halteres pale yellow

including the stalk; calypteres gray, margin and fringe dark brown.

♀ similar to the ♂ but darker in color, yellow incisures on edges of abdominal segments more conspicuous, genitalia shiny black.

Holotype ♂ reared August 1937, Sao Paulo, BRAZIL, by Luiz O. T. Mendes. Seven paratypes; six males and one female bearing same date and locality. Holotype will be deposited in the U. S. National Museum.

This species runs close to *quadrata* in Malloch's key to the Diptera of Patagonia and Chile, 1934. It differs in coloration and in the number and position of the acrostichals. In *braziliensis* there are only four rows of acrostichals and they extend the whole length of the mesonotum.

Agromyza ecuadorensis n. sp.

A large species, 4.5 to 5 mm.

♂: Front, face, cheeks, palpi, scutellum and legs largely yellow, margin and fringe of calypteres dark brown.

Front pale yellow; orbits darkened on upper half, front together with orbits as wide as either eye, sides parallel, four strong pairs of orbital bristles, about equally spaced in their rows, the lower two pairs turned inward, the other pairs turned upward, orbital hairs sparse, minute, almost invisible; frontal lunule not conspicuous; cheeks yellow, at narrowest portion less than one-half the eye-height, cheeks narrower in front than behind; a strong pair of oral vibrissae accompanied by a row of strong setae along the lower edge of the cheeks; proboscis and palpi, yellow; setae of palpi black, those on proboscis yellow; antennae entirely yellow, third segment short rounded at the tip; arista black, nearly bare, swollen on the basal one-fifth, about four times the length of the third antennal segment; occiput shiny black continuous with the ocellar triangle and upper orbits.

Mesonotum subshiny black, a large yellow spot on the posterior margin, the anterior margin of this spot prolonged into a point reaching nearly to the middle of the mesonotum; the black area of the mesonotum broader than in *braziliensis* with

the result that the presutural bristles are situated well within the dark color; scutellum broadly yellow in the middle and below, darkened on the sides; pleurae largely black, the pteropleura, mesopleura, and sternopleura with large black spots, only the upper edges of these narrowly yellow; four well-developed pairs of dorsocentral bristles, about four rows of acrostichals, these do not extend to the posterior margin of the mesonotum, they terminate before the yellow spot with the exception of one minute pair just before the scutellum, the acrostichals are not as strong as in *braziliensis* and are more sparse; one strong sternopleural bristle accompanied by numerous smaller setae, mesopleura with one strong bristle and numerous smaller setae along the upper edge; humeral bristle strong accompanied by numerous smaller setae.

Legs largely yellow, front femora and tibiae yellow, middle and hind tibiae darkened, all tarsi darkened, coxae yellow with darkened spots at the bases, mid tibia with a distinct posterior bristle near the middle.

Abdomen entirely brown, incisures very indistinctly yellow, last incisure only conspicuously yellow; genetalia dark brown, yellow only in the middle.

Wings hyaline, slightly smoky, base of costa and first vein to the humeral cross vein distinctly yellow, wings rounded at tips, auxillary vein faint but ending separate from vein one in the wing margin, costa extending to the fourth vein, two strong setae on the base of costa, anterior cross vein slightly before the end of vein one and situated in the middle of the discal cell, anterior cross-vein about one-fourth the length of the posterior cross-vein, veins two and three diverging slightly at their tips, veins three and four nearly parallel at their tips, distal section of fifth vein about one and a quarter times the length of the penultimate section; halteres pale yellow including the stalk; calypteres gray, margin and fringe dark brown.

Holotype ♂, Baños, ECUADOR. February 19, 1937. Collected by S. W. Frost. Differs from *braziliensis* in coloration, smaller and more sparse acrostichals and only one pair of presutural bristles. The holotype will be deposited in the U. S. National Museum.

Iridescence.

By Wm. T. M. Forbes, Cornell University,
Ithaca, New York.

(Continued from page 44.)

Chlorippe cyane reducta (Peru). 1, purple spot on fore wing oriented, light 30 U 0; viewed at almost any angle, with azimuths under L or 75 R, perhaps best at 45 U 0, and converse.

2, Deep purple edges of hind wing oriented 30 U 90 L; 45 U 0. It also appears at various other angles, such as 30 U 0; 60 U 90 L; but at the majority of orientations is invisible,—e. g. at 45 U 180; 45 U 0 there is no purple on either fore or hind wing, though the blue of hind wing is plain.

3, specular at medium angles, a large blue patch on hind wing,—blue at 45, green at 90, fainter but very green at 30 U 180; 45 U 180; strongest purple at 30 U 0; 30 U 180 and converse, but weak at right angles to this.

4, under side of hind wing shows rather critical purple shades near base of costa in cell and above middle of outer margin at 90 U; 90 U, the angle of light more critical than the angle of sight.

C. cyane (typical, from Columbia). 1, is more critical, best at 30 U; 45 U 0. 2, is intense blue rather than purple at most angles, e. g. 15 U 0; 45 U 45 L, but is purple at 15 U 0; 60 U 90 L. 3, is the same. 4, not distinct.

C. c. burmeisteri (Argentine). 1, same but weaker. 2, at same angles as *cyane,* but matching the specular patch in color, —at 15 U 0; 45 U 45 L only the border is bright, at specular angles only the large patch. 3, specular and blue at almost all angles; not becoming green at high angles or even at 30 U 180; 45 U 180, but purple at grazing angles (15°) regardless of direction. 4, like *reducta.*

C. cherubina (South America). 1, blue, not purple, at same angles. 2, intense green at 15 U 0; 30 U 45 L, where patch is a faint brassy green; changing rapidly to purple at 30 U 0; 45 U 60, at which angle the patch is a brilliant brassy green.

3, yellow green at 90, blue green at 45, blue at 30; purple at grazing, green at other than specular angles. 4, not distinct.[1]

[1] The most distinctive angles for the determination of blue Chlorippes are: 1, 30 U 0; 45 U 0 for the purple of *cyane* and blue of *cherubina* on fore wing (i. e. back to light, head of butterfly to observer, tilted at a low angle). 2, 90; 90 to discriminate specular colors best (blue of *burmeisteri,* blue-green of *reducta,* green of *cyane* and *cherubina*), also extent of specular blue or green on fore wing.

C. pavon (South America). Oriented 45 U 0; 60 U 0. a slightly freakish case, visible from most angles if light and sight are about the same and front or left, but not rear or right.

C. laure (South America) Oriented. 45 U 45 L; 45 U 45 L. A brilliant purple patch, overlapping the orange slightly on fore wing and giving it a salmon tint. This is more critical than the last, but still conspicuous from horizontal angles of 0 to 90 L. At 90; 90 however there is no iridescence.

Apatura iris (Europe). Of the same type as the last but still more critical,—probably best at 45 U 45 L, 45 U 45 L. At 0 horizontal angle the purple is almost lost from the fore wing, but at 30 U 180; 45 U 90 L it is almost confined to the fore wing.

Thanaos lucilius (Eastern U. S.). *T. lucilius* and *baptisiae* are an example of extremely difficult and critical iridescence. It is very faint, best visible under low power of the microscope and with a dark background, but as illumination and vision should be at nearly right angles it is convenient to use a microscope. The color changes under such a narrow range of angles that the color may perhaps be due to striation rather than the usual thin plates.

1, Oriented 15 U 90 R; 75 U 90 L. Green, shading from somewhat bluish to somewhat brassy and strongest close to margin.

2, 30 U 90 R; 60 U 90 L, in a very narrow range a little less rather than more than 30°. Light portions varying from coppery through rose to crimson, dark portions very faintly crimson to violet.

3, 45 U 90 R; 45 U 90 L. Brassy on light portions, very faintly purple on postmedial dark band.

At still deeper angles the iridescence goes through green to copper again at grazing view and perpendicular light.

4, 5 U 90 L; 90 U (grazing from opposite side) copper, the dark parts not distinguishable.

5, 15 U 90 L; 90 U. The best (and a rather decided) green, the dark postmedial stripe well contrasted.

6, 30 U 90 L; 60 U 90 R. Light parts brassy, dark parts with very faint purple and hints of rose.

7, 45 U 90 L; 45 U 90 R. Green again.

At higher angles of illumination and going to grazing angle of sight it goes again through copper before fading out.

T. baptisiae (Woods Hole, Mass., holotype). Essentially the same rapidly changing series of colors but much toned

down. 1, faint green at margin, stronger and flecked with copper in fringe; 2, light portions faintly brassy toward margin, shaded with traces of rose along veins; 3, as before but much toned down and dominated by the brown ground color; 4, 5, 6, 7 the iridescenses of T. lucilius can be just divined in the best lighting but are wholly dominated by the pigment browns and buff. The greener or brassy appearance mentioned in the original description of baptisiae is due to the greater dominance of the brown to yellowish pigment colors, which kill the purple but reinforce the brassy tints of the iridescence.

Talanga. (Indo-australian). This is the genus that started the present study.

The iridescence is brilliant, only slightly oriented, but varies enormously with angle. For the discrimination of species[2] the best position seems to be with light and sight both at medium angles from opposite sides.

T. sabacusalis (New Guinea). 30 U 90 L; 60 U 90 R. Oriented and changeable. Ground of fore wing bright rose, except base and borders; postmedial area and outer subterminal stripe the same. Double spot at end of cell, spot below and beyond it and inner st. stripe brilliant blue, specular. Hindwing with a triangular area covering forks of Cu and M_2 and $_3$ the same, shading into brassy and green on basal half, except anal area, the postmedial costal area less brilliantly rose; a short postmedial bar brilliant blue, shading into greenish, specular, but only visible when angles of light and sight correspond closely, also with a slight rose edging; marginal patch mixed copper, brass, purple and green, going to dark bronze at 15 U 90; 90 U.

At 45 U 90 R; 45 U 90 L the same colors show, but not at reciprocal angles (save the blue).

T. tolumnialis (New Guinea) 30 U 90 L; 60 U 90 R. Similar; base with two narrow stripes of silvery iridescence; blue at end of cell as before; pm. area silvery rather than rose, but both st. stripes dull rose, alike, the inner halves of both going to bright blue and outer halves going dull at grazing angle (5 U; 90 U). Hind wing as before, but less brilliant, except for the costo-apical region which is rose and distinctly runs into the metallic marginal patch. I cannot see Janse's key character between the hind wings of these species. Both

[2] See Janse, Pyralidae in Mem. Mus. R. d'Hist. Nat. de Belgique; Resultats Scient. du Voyage Ind. Or.Néer. Leopold, iv fasc. 12, 11-16, pls. 3-5, 1935. He writes me that his descriptions were made with light at right angles from the side.

show the same iridescence in color and position, only the present is less brilliant.

T. sexpunctata (Formosa, Timor). Iridescence on the same plan and visible at the same angles; but with the basal and postmedial areas of fore wing intermediate, blue shading into rose, and hind wing with the rose beyond the p. m. bar stronger, extending to the marginal patch, which latter is almost evenly green.

So far then as these three species are concerned we might modify Janse's key as follows:

4*a*. Basal half of fore wing (viewed at 30 U 90 L; 60 U 90 R or 45 U 90 R; 45 U 90 L) evenly rose to violet except the narrow base and borders; green and brassy iridescence on basal half brighter than rose on outer part of costal area .... *subacusalis*

b. Iridescence of basal half of fore wing interrupted by a broad yellow stripe; largely blue or silvery; rose on outer part of costal area stronger than that on base of hind wing 5

6*a*. Iridescence of basal half of fore wing bright, largely blue; iridescent marginal patch of hind wing green; the black immediately before it in the form of a heavy double crescent corresponding to the two marginal dots, *sexpunctalis*

b. Iridescence of basal half of fore wing pale and silvery; marginal patch of two portions, a small copper one close to margin, and a broader and faintly silvery one before it, bounded on the inner side with a more distant, even and finer brown-black line................ *tolumnialis*

The cordatus-group of Agabus (Coleop.: Dytiscidae).

By Melville H. Hatch, University of Washington, Seattle, Washington.

Agabus bjorkmanae nom. nov.

Anisomera recta LeC., Ann. Mag. Nat. Hist. (4) IV, 1869, p. 375.—Crotch, Trans. Amer. Ent. Soc. IV, 1873, p. 424.

Agabus rectus LeC.*—Sharp, On Aquat. Carn. Col. 1880-82, p. 756.

Agabus (Gaurodytes) rectus LeC.—Seidlitz, Verh. Nat. Ver.

* Preoccupied in *Agabus* by *Colymbetes (Agabus) rectus* Babington, Ann. Mag. Nat. Hist. VI, 1841, p. 53, now considered a synonym of *striolatus* Gyll.

Brünn XXV, 1887, p. 84.—Zimmermann, Col. Cat. 71, 1920, p. 171.

Agabus (Hydronebrius) rectus LeC.—Fall, Rev. N. A. Species Agabus, 1922, pp. 1, 3, 9.—Zimmermann, Kol. Rundsch. XX, 1934, p. 152.

This species is sufficiently distinguished from *cordatus* LeC. by Fall, but the pronotum is very variable. One extreme is represented by specimens in which the width of the base is just visibly greater (about one per cent) or barely less (three or four per cent) than the middle, the sides behind the middle nearly straight, not or very slightly sinuate, the hind angles rectangular or nearly so. At the other extreme are specimens in which the width of the base is distinctly less (six to nine per cent) than that of the middle, the sides behind obliquely convergent, the hind angles somewhat obtuse. Were it not for the existence of intermediates, one would scarcely hesitate to recognize two species. The color is usually black, but in one specimen, perhaps from immaturity, the vertex of the head is faintly bimaculate, the sides of the pronotum, the side pieces of the prothorax, the elytral epipleurae, and the apices of the last four abdominal segments are rufescent.

Distribution. British Columbia: Fernie, Merritt (*Leech*), Van [couver Is.] (*type*). Alberta: Beaver Cr. (*Leech*), Happy Valley (*Lane, Leech*). Washington: Blue Mts. (Coppei Cr., Mill Cr.), Wawawai (*Fall*). Idaho: Troy (*Lane*), Waha. Oregon: Kamela, Meachem.

I am renaming this species after Miss Frances Bjorkman, the collection by whom at Fernie, British Columbia, of a series with extremely obtuse posterior pronotal angles brought the variable nature of the species to my attention.

In view of the extreme form assumed by certain specimens of this species, it will be necessary to insert "usually" between "prothorax" and "narrower" in the first line of Fall's key (l. c., p. 3) so that it reads "Prothorax usually narrower at base than near middle."

Agabus cordatus LeC.

Anisomera cordata LeC., Proc. Acad. Nat. Sci. VI., 1853, p. 226; Col. Kansas 1859, p. 5, pl. 2, fig. 3.—Crotch, Trans. Amer. Ent. Soc. IV, 1873, p. 424.

Agabus (Anisomera) cordatus LeC.—Sharp, On Aquat. Carn. Col. 1880-82, p. 494, pl. xiii, fig. 165.

Agabus (Gaurodytes) cordatus LeC.—Seidlitz, Verh. Nat. Ver. Brünn XXV, 1887, p. 84.—Zimmermann, Col. Cat. 71, 1920, p. 163.

Agabus (Hydronebrius) cordatus LeC.—Fall, Rev. N. A. Species Agabus 1922, pp. 1, 3, 9.—Zimmermann, Kol. Rundsch. XX, 1934, p. 152.

The pronotum of this species is strongly cordate, the width at the base being five-sixths or less that at the middle. The hind angles vary from slightly acute to somewhat obtuse, usually being nearly rectangular, with the sides in front of the hind angles usually subparallel for an appreciable distance before curving out. In one of a pair of specimens from Colorado Springs, Colo., however, the sides curve out almost immediately from the hind angles. The color is usually piceous, as Fall describes, but I have seen a nearly black specimen from Mt. Lemon, Ariz.

Distribution. MONTANA: Missoula (*Fall*); COLORADO: Colorado Springs and Leadville (*Fall*), Morley (*Cal. Acad.*); NEW MEXICO: Santa Fe (*type*), Pecos (*Fall*); ARIZONA: Mt. Lemon (*Cal. Acad.*); UTAH: Ft. Douglas (*Fall*), Salt Lake; WASHINGTON: Longmires = ?Longmire (*Cal. Acad.*).

Fall and Zimmermann have suggested that *cordatus* and *rectus* belong in the subgenus *Hydronebrius* Jakovl., but this subgenus is distinguished in important measure not only by the subcordate pronotum but by the absence of setae from the inner apical angle of the lower surface of the metafemora and the irregularly punctuate lower surface of the metatibiae. As regards the metafemora, both of the species possess the setae said to be absent in *Hydronebrius*. The condition of the metatibiae is more ambiguous, but is nearly similar to a species like *seriatus* Say, which no one would suggest placing in *Hydronebrius*. Furthermore Zimmermann (l. c., pp. 156-158) notes numerous Palaearctic species of the subgenus *Gaurodytes* in which the sides of the pronotum are convergent behind, so that the precise placing of the interesting Nearctic species here considered must await future study.

I am indebted to Mr. M. C. Lane and Mr. Hugh B. Leech for specimens and suggestions used in prosecuting this study.

Mortality of Aquatic Diptera Due to Freezing.[1]

By J. W. LEONARD.

Factors influencing the abundance of insects spending all or parts of their life cycles in fresh water are coming to receive a larger amount of attention than formerly, largely because of a better appreciation of the economic importance of such organisms in the food cycle of game fishes. Although the general population level of such insects is in the main regulated by the interaction of recognized and more or less predictable ecological factors, the rare occurrence of a sudden, catastrophic change in some part of the environment may drastically reduce the numbers of a particular species, even though normal conditions may return as rapidly as they were banished.

An example of a catastrophe of this sort was witnessed recently in a small (seven-acre) pond in Livingston County, Michigan. The last two weeks of March, 1938, were characterized by unusually high temperatures, which on one occasion rose above 80°F. The warm weather was broken abruptly on the night of April 4 when the temperature dropped to 24°F. Early the following morning, when a visit was made to the pond, it was found that all save a small protected portion of the pond's surface was covered with ice which, near shore, reached a thickness of one-half inch.

The period of ice formation had obviously coincided with the time of emergence of a great number of midges, *Chironomus plumosus* (Linn.)[2], for around three sides of the pond the ice was thickly dotted with pupae and adults of this species either wholly or partially embedded therein. Mortality appeared to be universal among the pupae and adults that were entirely embedded. One pupa, held to the ice by the extreme tip of the abdomen only, was alive when found, although its ability to have emerged successfully upon release is open to question. A small number of adults which had apparently completed their emergence before the ice formed lay in a numbed condition on

[1] Contribution from Institute for Fisheries Research, Michigan Department of Conservation and University of Michigan.

[2] Determined by Prof. M. W. Boesel.

the surface of the ice until they were warmed into activity by the sun, when they were eaten by a tree swallow, (*Iridoprocne bicolor*), which swooped repeatedly to within a few inches of the ice. By late afternoon, when all the ice had melted, large windrows and rafts of lifeless pupae and adults collected in eddies and shallow embayments around the shore.

Owing to the tendency of an entire age-group of midges to emerge at about the same time, there exists a strong likelihood that the local population of this economically important midge sustained a severe reduction. A few observations made at about the same time for the next two or three years should settle the question definitely. In any event, it is felt that the present case offers an illuminating demonstration of how disaster to an important component of a fauna may strike, do its damage, and disappear, leaving only the briefest record of its nature. It may be that such an occurrence is not uncommon, but goes undetected because no observer is present at the time.

The Usage of the Names Epizeuxis Hübner and Zanclognatha Lederer (Lepidoptera, Phalaenidae, Herminiinae).

By J. G. Franclemont, Ithaca, New York.

At the suggestion of Dr. J. H. McDunnough, of Ottawa, Canada, I am writing this in an attempt to straighten out the usage of the generic names *Epizeuxis* Hübner, *Camptylochila* Stephens and *Zanclognatha* Lederer.

The genus *Epizeuxis* was proposed by Hübner in 1818 (Zutr. z. Samml. exot. Schmett., i, 9) containing two species *Epizeuxis lituralis* Hbn. (figs. 19 and 20) and *Pyralis calvarialis* D. and S.; Grote designated the latter species as type in 1874 (Bull. Buff. Soc. Nat. Sc., ii, 47). Stephens described *Camptylochila* in 1834 (Ill. Brit. Ent., Haust., iv, 21) for two new species *undulalis* and *bistrigalis* which equal respectively *Epizeuxis aemula* Hbn. and *E. lubricalis* Gey.; Barnes and McDunnough 1917 (Contrib. Nat. Hist. Lep. N. Am., iv, 125) designate *Camptylochila undulalis* Steph. (*E. aemula* Hbn.) as type, and the genus thus falls to *Epizeuxis* Hbn. *Helia* Guenée 1854

(Spec. Gen. Lep. viii (Deltoides), 75) nec *Helia* Hübner 1818 (Zutr. z. Samml. exot. Schmett., i, 27) with type *Pyralis calvarialis* D. & S. designated by Guenée (op. cit.) is a synonym also; likewise *Pseudaglossa* Grote 1874 (Bull. Buff. Soc. Nat. Sc., ii, 47) with type *Epizeuxis lubricalis* Gey. designated by Grote (op. cit.).

Lederer proposed the genus *Zanclognatha* in 1857 (Noct. Europas, 211) including six species; Grote 1874 (Bull. Buff. Soc. Nat. Sc., ii, 49) designated the first species *Paracolax tarsiplumalis Hbn.* as type. The following three genera described by Grote are considered synonymous; *Cleptomita* 1873 (Trans. Am. Ent. Soc., iv, 301) with the sole included species *C. atrilineella* Grote automatically becoming the type; *Megachyta* 1873 (Trans. Am. Ent. Soc., iv, 306) with the one included species *Epizeuxis lituralis* Hbn. becoming automatically the type; *Pityolita* 1873 (Bull. Buff. Soc. Nat. Sc., i, 39) including only the species *Herminia pedipilalis* Guenée which thus automatically became the type.

From the foregoing discussion it will no doubt be obvious that we must revert to the Smith (Revision of the Deltoid Moths, 1895) usage of the two names, and reject the usage advocated by Barnes and McDunnough (Contrib. Nat. Hist., Lep. N. Am., iv, 125, 1917) and again by McDunnough (Check List Lep. Can. & U. S. A., pt. i, Marcolep., 1938). The two genera and their synonyms may be cited as follows:

Epizeuxis Hbn.
Camptylochila Steph.
‡*Helia* Gn.
Pseudaglossa Grt.
Zanclognatha Ledr.
Cleptomita Grt.
Megachyta Grt.
Pityolita Grt.

substituting *Epizeuxis* Hbn. for *Camptylochila* Steph. and *Zanclognatha* Ledr. for *Epizeuxis* Hbn. as used by McDunnough in his latest Check List (page 129).

I wish to express my thanks to Mr. J. F. G. Clarke of the United States National Museum for consulting the original text of the Zutr. z. Samml. exot. Schmett., which is not in the Cornell University Library.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( )follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—**Anon.**—Index to publications of U. S. Dept. Agr. 1931-1935. U. S. D. A. 1937. **Anon.**—El Bachaco. [El Agric. Venezolano] 3, (31):22-24, ill. **Anon.**—Insects in Department of Biology. [Rep. Nat. Mus.] 1938:38-40. **Babcock, H. L.**—How to find a bee-tree. [New Engl. Nat.] 1: 2-3. **Bailey, H. L.**—Report of Revision of Insect control. [19th Bien. Rep. Comm. Agr. Vermont] 1937-38:74-90. **Beutler, R.**—Der geschmacksinn der Ameisen. [88] 50:822-823. **Bialaszewicz, K.**—Recherches sur le metabolisme chemique et energetique au cours du developpement des Insectes. [Soc. Sci. et Lett. Varsovie Trav. Inst. Nencki] Part III, Vol. 13:352-382; Part IV, Vol. 14:20-42; Part V. Vol. 14:229-272. **Bishopp, F. C.**—Some problems in medical and veterinary entomology. [Jour. Parasit.] 25:1-9. **Blair & Hubbell.**—The biotic districts of Oklahoma. [Amer. Midl. Nat.] 20:425-454, ill. **Cockerell, T. D. A.**—Studies of Island Life. [Univ. Colo. Stud.] 26: 1-20. **Crampton, G. C.**—The interrelationships and lines of descent of living insects. [5] 45:165-180, ill. **Curran, C. H.**—On eating insects. [Nat. Hist.] 43:84-89. **Darlington, P. J.**—The origin of the fauna of the Greater Antilles, with discussion of dispersal of animals over water and through the air. [73] 13:274-300, ill. **Daubenmire, R. F.**—Merriam's life zones of North America. [73] 13:327-332. **Daviault, L.**—Contribution a l'etude des Insectes du Bouleau [Contr. l'Inst. Zool. l'Univ.

Montreal] 1:134 pp., ill. **Folsom & Woke.**—The field cricket in relation to the cotton plant in Louisiana. [U. S. D. A.] Tech. Bull. 642:1-27, ill. **Hoyle, W. L.**—Transmission of poultry parasites by birds with special reference to the "English" or house sparrow and chickens. [Trans. Kansas Acad. Sci.] 41:379-383. **Huxley, J. S., et al.**—Papers for the second symposium "Geographical isolation as a factor in species formation." [Proc. Linn. Soc. London] 150th Session: 253-293. **Ihering, R. von.**—Em prol da catalogacao da fauna do Brasil. [Livr. Jubilar Prof. L. Travassos, Rio de Janeiro] 1938:221-229. **Lameere, A.**—Precis de zoologie V. Les insectes supérieurs. Chap. XVI les Holométaboliques (Lepid., Coleop., Hymenop.). [Recueil de l'Inst. Zool. Torley-Rousseau] 7:161-536, ill. **Li, Ju-chi.**—A simple technique for demonstrating insect chromosomes. [Peking Nat. Hist. Bull.] 13:111-112. **Long, C. I.**—Insect galls. [Sci. Monthly] Feb. 1939:152-158, ill. **Neiva, A.**—Lauro Travassos. [Livr. Jubilar Prof. L. Travassos, Rio de Janeiro] 1938: I-XVIII, portrait. **Pierce & Pool.**—The fauna and flora of the El Segundo sand dunes. I.—General ecology of the dunes. [38] 37:93-97. **Poulton, E. B., et al.**—Papers for the symposium "The concept of species from the time of Linnaeus to the present day." [Proc. Linn. Soc. London] 150th Session: 224-252. **Pratt, H. P.**—Ecology of the trout of the Gunnison River, Colorado. [Univ. Colo. Studies] 26: 114-118 [abstract of thesis]. **Proctor, W.**—Biological Survey of the Mount Desert Region. Part VI. The Insect Fauna. [Wistar Inst.] 1938: 496 pp., ill. **Ramsbottom, J.**—Linnaeus and the species concept. [Proc. Linn. Soc. London] 150th Session: 192-219. **Scheerpeltz, O.**—The spider-hunt of Priocnemis fuscus (Hym.-Psammocharid.) a chapter from the biology of a spider-hunter. [Photographie und Forschung] 2:201-211, ill. **Sen, P.**—A note on the overwintering of the house fly, Musca domestica. [Indian J. Med. Res.] 26:535-536. **Sturtevant, A. H.**—Essays on Evolution, III: On the origin of interspecific sterility. [73] 13:333-335. **Tamini, E.**—Drosofile, lieviti e batteri. [Natura] 29: 149-156. **de la Torre-Bueno, J. R.**—Unkind words on insect descriptions. [19] 34:57-58. **Trager, W.**—Acquired immunity to ticks. [J. Parasit.] 25:57-81, ill.

ANATOMY, PHYSIOLOGY, ETC.—**Anon.**—Reactions of house-flies to light of different wave-lengths. [31] 143: 208. **Aubertot, M.**—Présence d'un vaisseau dorsal contrac-

tile chez les Protoures du genre Acerentomon. [C. R. L'Acad. Sci. Paris] 208:120-122, ill. **Bodenstein, D.**—Imaginal differentiation inaugurated by oxygen in Drosphila pupae. [Proc. Nat. Acad. Sci.] 25: 14-16. **Bounhiol, J. J.**—Recherches expérimentales sur le déterminisme de la métamorphose chez les Lepidopteres. [78] 199 pp., ill. **Brecher, L.**—Der Weg der Farbanpassung bei Schmetterlingspuppen vom Rekeptor bis zum Effektor. [Biologia Generalia] 14:212-237, ill. **Buck, J. B.**—Synchronous rhythmic flashing of fireflies. [73] 13:301-314. **Buxton, P. A.**—Biology of Xenopsylla cheopis (Siphonaptera). [Indian J. Med. Res.] 26:505-530, ill. **Cameron, T. W. M.**—The reactions of the housefly, Musca domestica to light of different wave-lengths. [Canad. J. Res.] 16:307-342, ill. **Cappe de Baillon & Favrelle & Vichet.**—Parthenogenese et variation chez les Phasmes. [78] 72:1-46. **Clausen, R.**—Untersuchungen uber den männlichen Copulationsapparat der Ameisen, speziell der Formicinae. [41] 17:233-346, ill. **Cousin, G.**—La néoténie chez Gryllus campestris et ses hybrides. [78] 72: 79-118, ill. **Davis, R.**—The gross anatomy of Corizus lateralis (Hem., Corizid.). [Iowa State Coll. J. Sci.] 13:60-62. [abstract of thesis]. **Ebeling, W.**—Host-determined morphological variations in Lecanium corni. [Hilgardia] 11: 613-631, ill. **Ellenby, C.**—Metabolic rate of early vestigial and wild-type prepupae of Drosophila melanogaster in relation to genotype, sex, size. [Proc. Zool. Soc. London Abst. Papers] 108 (C):46-47. **Ephrussi & Chevais.**—Developpement des couleurs des yeux chez la Drosophile. [78] 72: 48-78, ill. **Geigy, R.**—Beobachtungen uber die Metamorphose von Sialis lutaria (Neurop.). [41] 17:144-157, ill. **Ghelelovitch, S.**—Influence du jeûne sur la métamorphose des chenilles de Galleria mellonella [C. R. Soc. Biol. Masson et Cie, Paris] 129: 1106-1107. **Gohrbandt, I.**—Dastympanalorgan der Syntomiden [34] 125:23-29, ill. **Grandjean, M. F.**—See under Arachnida. **Gwatkin & Fallis.**—Bactericidal and antigenic qualities of the washings of blowfly maggots. [Canad. J. Res.] 16 (D): 343-352. **Hathaway, C. R.**—Verificacao da viviparidade em Thysanoptera. [Mem. Inst. Oswaldo Cruz] 33:357-358, ill. **Jannone, G.**—Aspetti bio-morfologici e somatometrici des problema delle fasi nel Dociostaurus marocannus in Italia e fuori, con particolare riquardo alla provincia di Napoli. [Boll. R. Lab. Ent. Agr. Portici] 1:261-328, ill. **Kuhn, A.**—Weitere Untersuchungen

über den Gen-A-Wirkstoff bei der Mehlmotte Ephestia kühniella. [Nachrichten aus der Biol.] 2:239-249, ill. **Lameere, A.**—See under General. **Lepesme, P.**—Influence de la temperature et l'humidité sur la pathogénie de l'aspergillose des Acridiens. [C. R. Séances L'Acad. Sci. Paris] 208: 234-236. **Lison, L.**—Sur la structure et l'histophysiologie des tubes de malpighi chez le doryphore (Leptinotarsa decemlineata). [C. R. Soc. Biol. Paris Masson et cie] 129: 873-875. **Lloyd, P. C.**—See under Hymenoptera. **Mauser, F.**—Synchrome Metamorphose deplantierter Vorderbeine mit dem Wirtstiere, Dixippus morosus (Orth: Phasmid.). [Biologia Generalis] 14:179-211, ill. Mikulska, I. Porownaawcze studia nad sposobem zycia i przeolbràzenieum gasienic wstegó wek (Catocala). Lebensweise und Metamorphose. [Mem. de l'Acad. Polonaise Sci. et des Lett.] 1938 (B): 1-113, ill. **Minkiewiez, R.**—Les lois de la sexualisation des couleur chez les Insectes. [Soc. Sci. et des Lett. à Varsovie Trav. Inst. Nencki] 13:144-214. **Moon, H. P.**—The growth of Coenis horaria, Leptophlebia vespertina and L. marginata (Ephemeroptera). [Proc. Zool. Soc. London-Abst. Papers] 108 (C): 45. **Muller & Mackenzie.**—Discriminatory effect of ultra-violet rays on mutation in Drosophila. [31] 143:83-84. **Munchberg, P.**—Ueber die entwicklung und die Larve der Libelle Sympetrum pedemontanum Allioni, zugleich ein Beitrag uber die Anzahl der Häutungen der Odonatenlarven. [52] N. F. 7:559-568, ill. **Patay, R.**—Surla structure et l'histophysiologie des tubes de malpighi chez le doryphore. [C. R. Soc. Biol. Masson et Cie., Paris] 129: 1098-1099. **Peacock, A. D.**—Parthogenesis as illustrated in the late Dr. J. A. van Rossum's experiments with Pseudoclavellaria amerinae (Hym., Tenthr.). [101] 1938:1-13, ill. **Pictet, A.**—La distribution géographique des organismes et le problème du transformisme. [C. R. Soc. Phys. et d'Hist. Nat. de Genève)] 55:88-90. **Plagge, E.**—Bewirkung der Augenausfärbung der rotaügigen Rasse von Ephestia kühniella durch Implantation artfremder Hoden. [Nachrichten aus der Biol.] 2:251-256. **Pollitzer, O.**—Die Legerate von normalen Drosophila-Weibchen und die Einwerkung von Umweltbedingungen. [Lotos] 86:57-62. **Roy, D. N.**—Number of eggs of common house-frequenting flies. [Indian J. Med. Res.] 26:531-533. **Russo, G. V.**—Contributo alla conoscenza dei Coleotteri Scolitidi. Fleotribo: Phloeotribus scarabaeoides Parte Prima. [Boll. del R. Lab. Ent.

Agr. Portici] 1:1-260, ill. **Scharrer, B. C. J.**—The differentiation between neuroglia and connective tissue in the cockroach (Periplaneta americana). [J. Comp. Neur.] 70:77-88, ill. **Slack, H. D.**—Chromosomes of Cimex. [31] 143:78, ill. **Smith, C. F.**—The digestive system of Macrosiphum solanifolii (Homoptera: Aphid.). [43] 39:57-59, ill. **Snipes, B. T.**—Passage-time of various types of normal and poisoned foods through the alimentary tract of the cockroach Periplaneta americana. [Iowa State Coll. J. Sci.] 13:93-94. **Steinberg, D. M.**—Regulationsprozesse während der metamorphose der Insekten. 1. Experimentelle untersuchungen über die regeneration der flügel bei einigen schmetterlingen. [Biolog. Zhurnal] 7:310. **Sumi & Tsujuki.**—On the flavin (Vitamin B_2) of chrysalis of domestic silkworm, Part 1. The Flavin (Vitamin B_2) content of chrysalis of domestic silkworm. [Bull. Inst. Phys. Chem. Res.] 17:864-870. [in Japanese]. **Szent-Ivany, J. v.**—Zwei seltsame biologische-beobachtungen bei Lepidopteren. [34] 125:47-48, ill. **Tikusi, H.**—Lethal action of x-rays on eggs of the silkworm, Bombyx mori. [Bult. Sci. Fakul. Terkul. Kjusu Imp. Univ. Fukoka, Japanujo] 1938:155-162 [in Japanese, English summary]. **Weise, H.**—Die Atmung bei den Larven und Puppen der Schwebfliegen aus der Verwandschaft der Eristalinae unter Berücksichtigung ihrer Metamorphose. [94] 151:467-514. **Wheeler, G. C.**—See under Hymenoptera. **Whiting, A. R.**—Mutant body colors in the parasitic wasp Hydrobracon juglandis and their behavior in multiple recessive in mosaics. [Proc. Am. Phil. Soc.] 80:65-85, ill.

ARACHNIDA AND MYRIOPODA.—**Aitken, T. H. G.**—Ornithodoros talaje on the California mainland. [55] 15:12-13. **Grandjean, M. F.**—Au sùjet de la nèoténie chez les Acariens. [C. R. séances de l'Acad. Sci. Paris] 207:1347-1351. **Hambleton, E. J.**—A ocorrencia do Acaro tropical "Tarsonemus latus" causador da rasgadura dos folhas nos algodoaio de S. Paulo (Tarsonemid.). [Arq. Inst. Biol. Sao Paulo] 9:201-209, ill. **Kühnelt, W.**—Eurypelma rubropilosum. [Photographie und Forschung] 2:201, ill. (S). **de Mello-Leitao, C.**—Araignées américaines du Musée d'histoire naturelle de Bâle. [Rev. Suisse Zool.] 46:43-93, ill. (S*). **Michelbacher, A. E.**—Notes on Symphyla with descriptions of three n. spp. Symphella from California. [55] 15:21-28, ill. **Pierce, W. D.**—See under Hymenoptera.

THE SMALLER ORDERS OF INSECTS.—**Costa Lima, A. da.**—Sobre um Kalotermes do Rio de Janeiro. [Mem. Inst. Oswaldo Cruz] 33:360-361, ill. **Eichler, W.**—Bizarrifrons nov. gen. eine bemerkenswerte asymmetrische Federlingsgattung von Icteriden (Betrachtungen über morphologische Besonderheiten bei Mallophagen. [34] 124: 225-236 (*). **Fox, I.**—N. spp. and a n. gen. of Nearctic Siphonaptera. [10] 41:45-50, ill. **Hammer, M.**—Collemboles in Zool. East Greenland. [Medd. om. Gronland] 121 (2): 7-42. **Hathaway, C. R.**—See under Anatomy. **Keler, S.**—Ueber brasilianische Mallophagen. [109] 5:305-326, ill. (*). **Moulton, D.**—Rhipidothrips brunneus Williams (Thysanoptera). [55] 15:20. **Ricker, W. E.**—Notes on specimens of American Plecoptera in European collections. [Trans. R. Can. Inst.] 22:128-156, ill. **Silvestri, F.**—Primo contributo alla conoscenza dei Protura del Brasile e di Costa Rica. [Liv. Jubilar Prof. L. Travassos, Rio de Janeiro] 1938:441-445, ill. (*). **Tillyard & Fraser.**—A reclassification of the order Odonata. Based on some new interpretations of the venation of the dragonfly wing. [Australian Zool.] 9:125-169, ill. (*). **Pessôa & Guimarães.**—Contribuicâo para o conhecimento das Mallophagas das aves do Brasil. VII. Sobre uma nova especiedo genero Neophilopterus. [Libr. Jubilar Prof. L. Travassos, Rio de Janeiro] 1938:385-387, ill. (S*). **Werneck, F. L.**—Algumas especies novas de Mallophaga. [Mem. Inst. Oswaldo Cruz] 33:413-422, ill. (S?*). Sobre os mallophagos da cabra, do cavallo, e do jumento. [Mem. Inst. Oswaldo Cruz] 33:395-401. (S?).

ORTHOPTERA.—**Blair & Hubbell.**—See under General. **Cappe de Baillon & Favrelle & Vichet.**—(See Anatomy & Physiol.). **Costa Lima, A. da**—Uma nova especie do genero Tanusiella 1916 (Pseudophyll.). [Livr. Jubilar Prof. L. Travassos, Rio de Janeiro] 1938:137-138, ill. (S*). **Cousin, G.**—See under Anatomy. **Folsom & Woke.**—See under General. **Hubbell & Cantrall.**—A n. spp. of Appalachia from Michigan (Acridid.). [114] no. 389:1-22, ill. **Jannone, G.**—See under Anatomy.

HEMIPTERA.—**De Long, D. M.**—The genus Phlepsius. A study of the North American species with special reference to the characters of the male genitalia. [Lloydia] 1:232-244, ill. (*K). A review of the genus Scaphoideus (Cicadell.). [10] 41:33-45, ill. (k*). **Drake and Hamble-**

ton.—Brazilian Tingitoidea IV. [Arq. Inst. Biol. Sao Paulo] 9:51-57, ill. (*). **Drake & Poor.**—Seven new American Tingitidae. [19] 34:31-35. **Essig, E. O.**—Aphids feeding on celery in California.]Hilgardia] 11:459-492, ill. **Ferris & Usinger.**—The Family Polyctenidae. [Microent.] 4:1-50, ill. (k*). **Hambleton, E. J.**—O percevjo "Horcius nobilellus como nova praga do algodoeiro em S. Paulo. Observacoes preliminares. [Arq. Inst. Biol. Sao Paulo] 9:85-91, ill. **Hempel, A.**—Uma nova especie de "Aleyrodidae." [Arq. Inst. Biol. São Paulo] 9:313-314, ill. (*S). **Knight, H. H.**—Three n. spp. of Miridae from North America. [19] 34:21-23. **Knight, H. H.**—Strongylocoris Blanchard: six new species from North America. [Iowa State College J. Sci.] 13:1-7, ill. (*). **Lallemand, V.**—Homopteres nouveaux de la Collection du Deutsches Entomologisches Institut de Berlin-Dahlem. (Cercopid. & Fulgorid.). [109] 5:349-350. (S). **Sampson, W. W.**—The Aphid genus Kakimia in California. [55] 15:36-38, ill. (k*). **Schneider-Orelli, O.**—Untersuchungen über die Generations-verhältnisse der Fichtengallenlaus Sacchiphantes (Chermes) abietis. [Vierteljahr. Naturf. Gess. Zürich] 1938:29-107, ill. **Schultz, E. F.**—Una nueva plaga en los naranjales tucumanos: la "Cochinilla del Delta" (Mesolecanium deltae, Lizer). [Est. Exp. Agr. Tucuman] Circ. No. 66: 3-7, ill. (S). **Thomas, H. D.**—The distribution of the genus Notonecta in Mexico. [19] 34:1-8, ill. **Tuthill, L. D.**—Neotriozella and a new related genus (Psyllid.). [19] 34:51-54. (k*). **Verrier & Löw.**—Recherches sur les galles de Pemphigus sur Pistacia terebinthus. [78] 72:494-507, ill.

LEPIDOPTERA.—D'Almeida, R. F.—Estudo sobre tres generos da sub-familia Ithomiinae. [Mem. Inst. Oswaldo Cruz] 33:381-393. (S). Revisão do genero Pseudopieris. [Livr. Jubilar Prof. L. Travassos, Rio de Janeiro] 1938:25-31, ill. (S). Uma nova especie de genero Iphiclides. [Livr. Jubilar Prof. L. Travassos, Rio de Janeiro] 1938:33-35, ill. (S*). **Basinger, A. J.**—The orange tortrix, Argyrotaenia citrana. [Hilgardia] 11:635-669. **Bell, E. L.**—A n. gen. and five n. spp. of Neotropical Hesperidae. [40] no. 1013: 11 pp., ill. **Comstock, J. A.**—A new Apodemia from California. [38] 37:129-132, ill. **Comstock & Dammers.**—Studies in the metamorphoses of six California moths. [38] 37: 105-128, ill. **Dos Passos, C. F.**—The types of Lepidoptera described by J. D. Gunder. [40] no. 999; 16 pp. **Filho, L. T.**

—Contribuicao para o conhecimento dos "Euchromiidae" III Genero "Cosmosoma Huber 1827." [Arq. Inst. Biol. Sao Paulo] 9:59-65, ill. (S). **Guedet, E.**—Geometrid notes and n. spp. [55] 15:29-35. **Hagmann, G.**—Syntomideos (Amatideos-Euchromideos) do Estado do Pará. [Livr. Jubilar Prof. L. Travassos, Rio de Janeiro] 1938:185-194. **Kohler, P.**—Neotropische Psychiden aus dem Deutschen Entomologischen Institut. [109] 6:38-42, ill. **Kurz, W.**—Eine seltene Naturbeobactung Falter-"Mischling." [Kosmos] 2:65-66. **Meadows, D.**—An annotated list of the Lepidoptera of Santa Catalina Island, California. Pt. II.—Sphingidae and Arctiidae. [38] 37:133-136, Ill. **Moore & Rawson.**—A new Noctuid from Michigan. [114] no. 395; 2 pp., ill. **Rawson & Thomas.**—The occurrence of Hemiargus isola in northern Ohio. [19] 34:9-10. **Richards, A. G.**—A revision of the North American spp. of the Phoberia-Melipotis-Drasteria Group of moths (Phalaenid.). [70] 19: 1-100, ill. (k*). **Sauer, H. F. G.**—Notas biologicas sobre "Mimorista cambogiales." Pyraust. [Arq. Inst. Biol. Sao Paulo] 9:93-98, ill. **Szent-Ivany, J. v.**—See under Anatomy. **Vazquez, L.**—Contribuciones al conocimento de los lepidopteros mexicanos. [112] 9:209-223, ill.

DIPTERA.—Aczél, M.—Das system der familie Dorylaidae. Dorylaiden-Studien I. [34] 125:15-23. (k). **Aitken, T. H. G.**—Two new Aedes records for California (Culic.). [55] 15:13-14. **Borgmeier, T.**—Um novo genero de Phorideos de Santa Catharina. [Livr. Jubilar Prof. L. Travassos, Rio de Janeiro] 1938:87-89, ill. (S*). **Deshusses, J.**—Nervulation anormale de quelques Tipulidae. [41] 17:175-179, ill. **Galvão & Lane.**—Notas sobre os Nyssorhynchus de S. Paulo. VI. Revalidacão de Anopheles (Nyssorhynchus) oswaldoi 1922 e discussão sobre Anopheles (Nyssorhynchus) tarsimaculatus 1905. [Livr. Jubilar Prof. L. Travassos, Rio de Janeiro] 1938:169-178, ill. (S*). **Girard, R.**—Un cas d'évolution d' Hypoderma bovis De Geer sur le cheval. [C. R. L'Acad. Sci. Paris] 208:306-307, Ill. **Guimaraes, L. R.**—Sobre uma nova especie de Nycteribiidae. [Livro Jubilar do Prof. L. Travassos, Rio de Janeiro] 1938:183-184, ill. (S*). **Hoffmann, C. C.**—La formacion de razas en los Anopheles mexicanos. II. Anopheles albimanus y sus variedades en la republica Mexicana. [112] 9:107-180, ill. (*). **Hoffmann & Samano.**—Nota acerca de los criaderos

invernales de Anopheles albimanus en los pantanos de Vera Cruz. [112] 9:193,199, ill. **James, M. T.**—A systematic and ecological study of robber flies (Asilidae) of Colorado. [Univ. Colo. Studies] 26:70-74. [Abstract of thesis]. **Malloch, J. R.**—See under Special. **Mangabeira Filho, O.**—Sobre duas novas especies de Flebotomos. (Psychod.). [Mem. Inst. Oswaldo Cruz] 33:349-357, ill. (S*). **de Meijere, J. C. H.**—Die Larven der Agromyzinen. Vierter Nachtrag. [101] 1938:61-116, ill. (k). **Painter, R. H.**—Two n. sp. of South American Bombyliidae. [109] 6:42-45, ill. **Souza Lopes, H. de.**—Sobre quatro novas especies de Sarcophagideos do Brasil. [Livr. Jubilar Prof. L. Travassos, Rio de Janeiro] 1938:279-285, ill. (S*). Sobre uma nova especie do genero Stylogaster do Brazil (Conop.). [Mem. Inst. Oswaldo Cruz] 33:403-405, ill. (*). Sobre um interessante novo genero de Sarcophagidae, que apresenta reduccao dos esternitos abdominaes. [Mem. Inst. Oswaldo Cruz] 33:433-435, ill. (S*). **Souza Lopes & Mangabeira Filho.**—Contribuicao ao conhecimento do genero Neivamyia Pinto et Fonseca, 1930 e descripcao de uma nova especie (Muscid.). [Livr. Jubilar Prof. L. Travassos, Rio de Janeiro] 1938:287-290, ill. (S*). **Steyskal, G. C.**—New Stratiomyiidae and Tetanoceridae from North America. [114] no. 386; 10 pp., ill. **Vargas, L.**—Observaciones sobre la preferencia alimenticia sanquinea de la pseudopunctipennis en Temixco, Morelos. [112] 9:203-208.

COLEOPTERA.—Barber, H. S.—A new parasitic beetle from California. (Rhipiphoridae). [19] 34:17-20. **Bernhauer, M.**—Neue Staphyliniden aus Chile. [109] 6:12-15. **Bierig, A.**—Neue neotropische Staphylinidae der Subfam. Aleocharinae. [109] 6:16-31, ill. **Buck, J. B.**—See under Anatomy. **Camargo-Andrade, C. A.**—Algumas notas sobre Pyrophorus tuberculifer (Elaterid.) e descripcão de uma nova variedade bahiensis. [Livr. Jubilar Prof. L. Travassos, Rio de Janeiro] 1938:99-101, ill. (S*). **Cazier, M. A.**—Two new eastern tiger beetles, with notes (Cincindel.). [19] 34:24-28. Two new California Acmaeodera (Buprest.). [38] 37:137-140. **Chagnon, G.**—Coléoptèrc de la province de Québec. [Naturaliste Canadien] 66:8-16. (k). Contribution a l'etude des Coléoptères de la province de Québec. 1st to 5th fascicules. [Lab. Biol. l'Univ. de Montreal] 1938: 320 pp., ill. (k). **Guignot, F.**—Nouveaux Copelatus de l'Amerique du Sud et des Antilles. (Dytiscidae). [25] 43:

245-250. **Hatch, M. H.**—List of the Coleoptera taken by Mr. George P. Engelhardt in Alaska in 1938. [19] 34: 45-50. (*). **Hustache, A.**—Curculionides nouveaux de l'Amerique meridionale qui se trouvent dans le Deutsches Entomologisches Institut. [109] 5:334-349; 6:50-68. **Lane, F.**—Descripcao de uma especie nova do genero Prionapterus Guerin, 1832. (Prionidae). [Livr. Jubilar Prof. L. Travassos, Rio de Janeiro] 1938:263-267, ill. (S*). **Lison, L.**—See under Anatomy. **Mendes, D.**—Uma nova especie de Desmiphora, 1835 (Cerambycidae). [Livr. Jubilar Prof. L. Travassos, Rio de Janeiro] 1938:315-317, ill. (S*). **Muche, H.**—Ein monstroser Strategus Validus (Scarab.) [2] 34:142. (S). **Parsons, C. T.**—A key to the New World Amphicrossus (Nitidul). [19] 34:59-60. Notes on North American Nitidulidae, III: Phenolia, Soronia, Lobiopa, Amphotis. [5] 45: 156-164, ill. (k*). **Pic, M.**—Drei neue Coleopteren-Arten (Helodid. & Chrysomelid.). [109] 5:332-333. (S). **Ross, E. S.**—A n. subgen. of North American Saprinus (Histerid.). [55] 15:39-43. (k*). **Saylor, L. W.**—Revision of the Melolonthine subg. Phytalus of the United States (Scarab.). [50] 86:157-167, ill. (k*). Seven new Scarab beetles from California. [10] 41:54-58, ill. **Schedl, K. E.**—Scolytidae und Platypodidae. [109] 6:45-48. (S*). **Siepmann, C. C.**—Hister purpurascens recorded from North America. [19] 34:10. **Van Dyke, E. C.**—An exotic Conoderus new to California, with a new name for bicarinatus Van Dyke (Elater.). [55] 15:11. N. spp. and subspp. of west American Coleoptera, (Lampyrid., Mycetophagid., Pythid., Pyrochroid.). [55] 15:15-20 ill. (k*). **Wenzel, R. L.**—Short studies on the Histeridae—No. 2. [43] 39:10-14. (*). **White, B. E.**—A new Anisostena (Chrysomelid.) from Owens Valley, California. [19] 34:55-56, ill.

HYMENOPTERA. — **Bequaert, J.** — Another Central American social wasp accidentally introduced into the United States. [19] 34:30. **Carl, J.**—Un document myrmecologique. [41] 17:159-164, ill. **Clausen, R.**—See under Anatomy. **Cockerell, T. D. A.**—Bees collected on the California Islands in the spring of 1938. [Trans. San Diego Nat. Hist. Soc.] 9:37-38. **Cristobal, U. L.**—Dos Nuevos Auxiliares de la Fruticultura Argentina. [Lab. Zool. Agr. Univ. Nac. La Plata[. Bull. No. 4: [no pagination] mimeographed. (*). **Grenspan, E. M.**—A

rare Hymenopteran. [19] 34:54. **Linsley, E. G.**—Some n. genn. and spp. of Epeoline and Nomadine bees (Nomadid.). [55] 15:1-11. (k*). **Lloyd, P. C.**—A study of some factors governing the choice of hosts and distribution of progeny by the chalcid Oencyrtus kuvanae. [Philos. Trans. R. Soc. London] 229 (B):275-322. **Minkiewiez, R.**—Les types de comportement des males de Sphegiens. [Soc. Sci. et des Lett. à Varsovie Trav. Inst. Nencki] 11:20 pp. Les pompilides a nid fixe et ceux a nid momemtane. [Soc. Sci. et des Lett. à Varsovie Trav. Inst. Nencki] 11:48-60, ill. **Mitchell, T. B.**—The genus Lithurgus (Megachilidae). [5] 45:146-155. (k*). **Muesebeck, C. F. W.**—Three new Hymenopterous parasites of the Lemna fly. [10] 41:58-62, ill. A n. sp. of Heterospilus parasitic on an injurious Anobiid (Bracon.). [10] 41:62-63. **Pierce, W. D.**—The black widow spider and its parasites. [38] 37:101-104, ill. (*). **Sauer, H. F. G.**—Inimigos naturais da "Platyeda gossypiella" no estado de Sâo Paulo Vespas de predadoras e especies de parasitas con notas. Sobre a sua biologia. [Arq. Inst. Biol. Sao Paulo] 9: 187-199, ill. **Scullen, H. A.**—A review of the genus Eucerceris (Sphec.). [Oregon State Monogr. Stud. Ent.] 1: 80 pp. (k*). **Timberlake, P. H.**—N. spp. of bees of the gen. Diadasia from California. [19] 34:11-16. **Townes, H. K.**—Protective odors among the Ichneumonidae. [19] 34:29-30. The nearctic species of Netelia (Paniscus of authors) and a revision of the genera of Neteliini. [Lloydia] 1:168-223, ill. (*K). **Walter, Seaton & Mathewson.**—The Texas leaf-cutting ant and its control. [U. S. D. A. Circ.] No. 494: 1-18, ill. **Weld, L. H.**—A new Cynipid gall in Valonia. [10] 41: 51-52. Notes on Lytoxysta brevipalpis (Cynipid.): Charipinae). [10] 41:53. **Wheeler, G. C.**—Are ant larvae apodous? [5] 45:139-145, ill. **Wolfgang von Hagen, V.**—The ant that carries a parasol. [Natural Hist.] 43:27-32, ill.

SPECIAL NOTICES.—The Calyptrate Diptera of New Zealand Parts VIII and IX. Malloch, J. R. [Trans. & Proc. R. Soc. N. Zealand] 68:161-258, ill. **Coccidae** of quarantine value for U. S. S. R. and their allied species. By Ph. Zaitzev. [Plant. Quar. Inspect. Georgia] 1937: 3-272, ill. [in Russian]. **Notes on Australian** Muscoidea III. Dexiinae, Phasiinae, some Tachininae and Appendix. By G. H. Hardy. [Proc. R. Soc. Queensland] 49:53-70. **Summary of literature** under various headings. [Fortschritte der Zoologie] 3.

ENTOMOLOGICAL NEWS

VOL. L. MAY, 1939 No. 5

Notes on Pennsylvania Flea Beetles in Tobacco Fields. (Coleoptera: Chrysomelidae).[1]

By HAROLD C. HALLOCK, Pennsylvania State College.

This discussion deals with eleven species of flea beetles found in Pennsylvania upon tobacco or upon other plants growing either in the tobacco fields or in adjoining fields. The collections were made by shaking all insects from individual plants into a net and transferring the contents to a killing jar. The material was stored in alcohol until it could be studied. During the seasons of 1937 and 1938 over 6300 flea beetles were collected.

The study was confined to three localities in Lancaster County, Pennsylvania. Approximately 60 percent of the collections were made at the Pennsylvania State College Tobacco Experiment Station where the major portion of the insecticidal tests were conducted. The Tobacco Experiment Station is located about one mile northeast of the city of Lancaster. About 25 percent of the collections were made on the farm of J. Martin Esbenshade, Jr., where additional insecticidal tests were conducted. The Esbenshade farm is about one fourth of a mile east of the Tobacco Experiment Station. Nearly 15 percent of the collections were made on Clyde Eshleman's farm where part of the 1937 flea beetle insecticidal tests were conducted. The Eshleman farm is located at Letort which is about 11 miles southwest of the Tobacco Experiment Station.

It will be noted in Table I that *Epitrix parvula* F. (tobacco flea beetle) and *Epitrix cucumeris* H. (potato flea beetle) were the important flea beetles on tobacco, although *Systena taeniata* var. *blanda* M. (pale striped flea beetle) caused some loss in

[1] Authorized for publication on February 4, 1939, as paper No. 890 in the Journal Series of the Pennsylvania Agricultural Experiment Station.

1937 by feeding on newly transplanted tobacco. The table also points out that wheat was the only plant from which no specimens of *Epitrix parvula* were captured, even though collections were made whenever flea beetles were seen on plants growing in the immediate vicinity of these three tobacco fields. The flea beetles were observed on wheat in May and early June.

TABLE I. FLEA BEETLES COLLECTED IN VICINITY OF PENNSYLVANIA TOBACCO

Number of Individual Beetles Taken on Each Plant

Host plant	Month	prv.	cuc.	fus.	con.	pul.	pro.	blan.	fro.	bor.	vit.	bip.[1]
Tobacco	May	11	112									
"	June	62	50					8				
"	July	211	12		3	12		1				
"	Aug.	400	13			2				1		
"	Sept.	1561	8		2	1						
"	Oct.	271				1	1					
Potato	May	3	267	3	1							
"	June	15	759	9		1						
"	July	26	286					2				
"	Aug.	44	30									
"	Sept.	91	149	2								
Tomato	May	13	95			1						
"	Sept. & Oct.	54	4		1	6	1					
Ground cherry		101	134			3	1					
Morning glory		47	7		144							
Jimson weed		62										
Indian mallow		201	6		3		5					
Corn		251	29	1	1	49						
Sweet potato		9	6		33							
Beet		19										
Soy bean		69							5			
Wheat					17	3						
Rape		2	2		3	1					15	1
Artichoke		29	2		7		1					
Peach		56	12									
Zinnia		27										
Plantain		29	18					4		9	2	
Pig weed		6	14		22	9		7				
Canada thistle		37	2					2				
Dock		13										
Burdock		24	12		4							
Hibernating under a grass mat in Sept.		8	1			2	6					

[1] par. = *Epitrix parvula* F. (tobacco flea beetle). cuc. = *Epitrix cucumeris* H. (potato flea beetle). fus. = *Epitrix fuscula* C. (eggplant flea beetle). con. = *Chaetocnema confinis* C. (sweet potato flea beetle). pul. = *Chaetocnema pulicaria* M. (corn flea beetle). pro. = *Chaetocnema protensa* L. blan. = *Systena taeniata* var. *blanda* M. (pale striped flea beetle). fro. = *Systena frontalis* F. bor. = *Dibolia borealis* C. vit. = *Phyllotreta vittata* F. bip. = *Phyllotreta bipustulata* F.

In the case of the non-economic host plants the collections were made chiefly in the fall months to determine whether the flea beetles would feed readily upon weeds, etc., when the preferred food plants were not available, so the month is not given in the table. The number of each species, which is given in the table, shows only the total number of specimens collected. The relative abundance on the host plants will be discussed under each plant. Some of the unimportant host plants will not be discussed.

Tobacco. The 1937-38 observations in Pennsylvania showed seven species of flea beetles feeding on tobacco but only three species were sufficiently abundant during these seasons to cause any economic loss to the growers. Under Pennsylvania conditions *Epitrix parvula* F. is the most important flee beetle on tobacco. Adults of *Epitrix parvula* were seen in the field from April 20 to November 10 yet this species did not cause extensive injury on tobacco leaves until after July 10, 1937 and the middle of August in 1938. When the adults of *Epitrix parvula* became abundant on the tobacco, the leaves were soon filled with characteristic small feeding holes.

There was a heavy migration of *Systena taeniata* var. *blanda* M. from lamb's quarters (*Chenopodium album* L.), pig weed (*Amaranthus retroflexus* L.) and Canada thistle (*Cirsium arvense* L.) to newly transplanted tobacco about the middle of June 1937. The relative abundance of *Systena taeniata* var. *blanda* on tobacco is not indicated in the table as the wilted condition of the freshly transplanted tobacco made it very difficult to collect flea beetles in any numbers.

During May and June 1938 *Epitrix cucumeris* was more abundant on tobacco than *Epitrix parvula.* While the tobacco seedlings were still in the seed beds *Epitrix cucumeris* adults made their way into the seed beds and in some cases caused extensive riddling of the young tobacco foliage. When the tobacco was transplanted in 1938 there was a heavy migration of *Epitrix cucumeris* to the newly set tobacco plants. The feeding of *Systena taeniata* var. *blanda* in 1937 and *Epitrix cucumeris* in 1938 on newly transplanted tobacco caused heavy

loss to the Pennsylvania growers as the flea beetles riddled the leaves and destroyed the growing tip of the young tobacco plants. As a result of this feeding many young tobacco plants died and the growers were forced to reset a larger number of plants than usual and in some cases secured a rather uneven stand of tobacco.

Published records fail to show that *Systena taeniata* var. *blanda* has previously caused severe injury to the tobacco crop. Although Duckeet (1920) did not mention tobacco in his list of food plants of *Systena taeniata* var. *blanda* he gave a wide variety of food plants. These facts lead to the conclusion that *Systena taeniata* var. *blanda* is likely to attack tobacco only when it is unusually abundant in the vicinity of tobacco fields as occurred in June 1937.

Morgan and Gilmore (1924) and Schoene and Underhill (1937) pointed out that *Epitrix parvula* is the important flea beetle pest of tobacco in the south. Lacroix (1935) stated that *Epitrix cucumeris* is one of the most important tobacco pests in Connecticut.

Potatoes. It has been pointed out in the table that six species of flea beetles were observed on potatoes during the 1937-38 seasons, but only *Epitrix cucumeris* and *Epitrix parvula* were abundant. Adult beetles of *Epitrix cucumeris* were observed upon potatoes nearly as soon as the potato tops appeared above ground in the spring and remained an important pest until fall. It is interesting to note that *Epitrix parvula* was scarce on early potatoes but became more common during July and continued numerous during August and September. It was not unusual in these fields during the period from August 20 to September 15 to find that 50 to 70 percent of the flea beetles on the potatoes were *Epitrix parvula.*

(To be continued)

The Significance of the Two Types of Larvae in Sphecophaga burra (Cresson) and the Factors Conditioning Them (Hymenoptera: Ichneumonidae).

By Rudolf G. Schmieder, Zoological Laboratory,
University of Pennsylvania.

In the ichneumonid wasp, *Sphecophaga burra* (Cresson), eggs laid upon the same host presumably by the same mother and under the same conditions of the physical environment may develop into either one of two distinct types of larvae. One of these spins only a delicate, white cocoon within which it develops forthwith into the imago; the other spins a tough, brown cocoon, and, before transforming, undergoes an extended diapause, normally lasting through the fall and winter, before it too pupates and finally emerges.

These facts, recorded in a recent paper (Schmieder 1939), raise the question of the significance of these two types of individuals and also the question of the nature of the determining factors that condition their production.

Significance in Survival

The idea that the individuals that spin the brown cocoons represent the typical form of the species (loc. cit. p. 94) finds further support from the fact that, of the two kinds, they are better adapted to survive the winter and therefore it is they, that could, if present to the exclusion of the other sort, still preserve the existence of the species.

The larvae that spin the white cocoons represent then a special type of individual with a shorter life history. Their significance, at least in regard to the survival of the species, is quite evident. They represent forms that emerge within about a week after spinning and can, no doubt, immediately give rise to another generation. A succession of such short generations occurring through the summer will effect a great increase in the numbers of the parasite.

In many insects, a succession of short summer generations is followed by a long, overwintering generation. In *Sphecophaga*, however, each generation produces larvae that transform

immediately as well as larvae that undergo a diapause, so that we have to do with an even more effective device for ensuring survival of the species. If, let us say, a single parasite finds a hornet's nest in which to oviposit, that parasite will, of course, have daughters (in white cocoons) which emerge forthwith and in turn give rise to several generations of the same kind through the summer. However, this same original parasite will also have other daughters (in brown cocoons) which will not emerge until the following summer. These ensure that our parasite will be represented by offspring in the following season even if conditions during the present season should become unfavorable and the "white" daughters die without progeny.

There is still another device assuring the survival of *Sphecophaga*. In *S. vesparum,* some of the larvae occupying brown cocoons remain in diapause only until the following spring, when they transform to emerge as adults; others remain in diapause through a second and even through a third winter before transforming (Semichon 1908). Thus the offspring are distributed in time of emergence through several seasons, increasing the probability that some at least will encounter a favorable season.

Determining Factors.

In regard to the determining factors that condition the production of larvae that spin white cocoons rather than larvae that spin brown cocoons, nothing is as yet known. In the years since my first observations were made I have frequently sought to obtain additional material with which I hoped to breed these parasites in the laboratory and possibly discover the factors involved. Of many nests taken only the two from Media, Pennsylvania, yielded any parasites at all, and those only seven cocoons. Of four parasites that emerged, two were lost. From the remaining two I attempted to secure offspring in the hope of developing some practical method of breeding the species for experimental purposes. I confined the two female *Sphecophaga* in large Comstock vials together with parts of combs containing pupae of yellowjackets, *Vespa* sp., from an under-

ground nest; also with exposed pupae from the same nest and with exposed and with cocoon-enclosed diapause larvae of the mud-dauber, *Sceliphron caementarium* Drury. In no instance was oviposition observed or were any parasitic larvae seen.

In the absence of workable experimental procedures, there remains only the possibility of attempting an analysis of the observational data at hand. The following table records the contents of each parasitized hornet's cell studied.

TABLE I

No. of parasites per host cell	No. of cells	No. of cocoons in each cell	
		brown	white
1	10	1	0
	2	0	1
2	14	2	0
	2	1	1
3	8	3	0
	3	2	1
	1	1	2
	1	0	3
4	1	4	0
	1	3	1
	2	2	2
	1	0	4
5	4	2	3
	1	3	2
	1	0	5
6	1	3	3
7	1	3	4
Totals	54	99	47

From it certain generalizations can be made regarding the occurrence of the white cocoons: 1) They occur least frequently in those cells that harbor less than three cocoons. For example, there were twenty-eight cells that contained only one or two cocoons each. In these twenty-eight cells there was a total of forty-four cocoons of which only four were white cocoons, that is 9%. 2) The white cocoons occur more frequently in cells having more than three cocoons each. Five cells with four parasites each yielded nine out of twenty, or 45% white cocoons. Six cells with five parasites each yielded nineteen out of thirty, or 63% white cocoons.

From these generalizations and from a further study of the cells containing four or more cocoons we may be justified in

concluding that: In cells harboring two or three brown cocoons, any additional cocoons present are more apt to be white cocoons than we should expect on a purely chance basis. Or, to put it another way: After several "brown" larvae have fed upon a given host, any additional larvae present are more apt to spin white cocoons.

Several years after first encountering *Sphecophaga* I began to study the biology of the chalcid-fly *Melittobia chalybii* Ashmead, and discovered in that species polymorphic forms which differed from each other not only morphologically but also, as do the two larval types of *Sphecophaga,* in the length of their life-histories (Schmieder 1933). In *Melittobia,* the larva of the type-form individual undergoes, even if kept at 25°C., a diapause lasting more than two months while the larva of the second-form adult, in the absence of a diapause, transforms immediately into the imago. The fact that in both *Melittobia* and in *Sphecophaga* there occur larvae with, as well as larvae without, an obligatory diapause suggests that a comparison of the phenomena encountered in these two insects may possibly yield evidence as to whether the determining factors that are known to be operative in *Melittobia* are also effective in *Sphecophaga.*

In *Melittobia* it has been shown (Schmieder 1933) that the production of one or the other of the two forms is determined by the trophic conditions obtaining during the larval growth period. A single host (e. g., *Trypoxylon* or *Sceliphron*) provides sustenance for from 500 to 800 larvae of this minute parasite. Not more than twenty of these, the first twenty, give rise in two weeks to "second-form," brachypterous females and eyeless males. All the hundreds of larvae that develop after these first twenty give rise, after a long diapause, to adults of the type-form.

In other Hymenoptera also, and indeed, among insects generally, trophic factors more frequently than any others are found to be the mechanism that conditions polymorphism. Upon *a priori* grounds it is then most probable that in *Sphecophaga* likewise trophic differences will be found decisive.

It may be that the mechanism for determination resembles that found in *Melittobia* and depends upon some quality in the food ingested by the larvae. The first few *Sphecophaga* larvae that feed upon a given host may take up largely the blood of that host while those that are somewhat retarded will have to ingest more of the fat-body and the urates stored therein. This view, which seems quite plausible, finds support in observations made by Reichert (1911) on *S. vesparum.* Reichert alone of those who have written on this species reports finding thin white cocoons along with the typical brown ones. From one nest he records seventy-eight brown cocoons and five white ones. The white ones, the "Kümmerformen," he believes result from undernourishment of the larvae and give rise to dwarf imagines. The dwarfs he obtained were only 2.25 mm. long compared with the largest giants, 8.5 mm. in length, from the brown cocoons. He also found cocoons intermediate in appearance between the normal and the starved kinds.

The dimorphism in *S. vesparum* in which absolute undernourishment produces white cocoons and in which intermediates between brown and white cocoons exist, would seem to represent an earlier evolutionary stage that finds its full development in the more definite dimorphism of cocoons, without evident undernourishment and without intermediate forms, in *S. burra.* In other words, the dimorphism in *vesparum* is imperfectly developed and differentiation is in proportion to the food supply; in *burra,* differentiation depends, probably, on which one of two inherently possible lines of development is stimulated by a difference in some quality of the food encountered by the larva at some critical period.

In regard to *S. vesparum,* it should be mentioned that, at least in England (Morley 1911), it exhibits a true dimorphism. In addition to the usual winged forms there occur brachypterous individuals. The latter, Morley suggests, represent a summer generation that emerges and oviposits in the same, still fully tenanted wasps' nest. Morley's descriptions of the cocoons also differ from those of continental authors, as does the absolute size of his specimens.

The sub-optimum trophic conditions that, as has been suggested, act at some critical period upon the larva to direct development along that alternative path leading to a white rather than to a brown cocoon may, of course, be due to other factors than the effect of the depletion of food by sister parasites. They may be due to differences in the parts of the body of the host upon which the individual parasites feed resulting, for example, in some individuals ingesting more urates than others. Or, if we consider that, in at least a few cells, white cocoons only were found, they may be due, occasionally, to the stage of development of the host, or to some other condition that affects all parasites in a given host cell equally.

Finally, it should be kept in mind that differentiation into one of the two possible types of individuals may take place as early as the ovarian egg. That differentiation may occur so early in ontogeny is shown in *Melittobia,* in which of the many eggs obtainable from unmated females ordinarily only 3% are capable of development (Schmieder 1938). In *Sphecophaga,* the observation that white cocoons appear more commonly in host cells containing a larger number of parasites would suggest that rapid egg-production yields a larger number of "white" individuals, while a slower egg-production, or longer retention of eggs in the ovary, has the opposite effect.

As long as we know nothing at all of the oviposition habits of *Sphecophaga,* and so very little of the life of the early larva, it is not possible to come to any definite conclusion as to the conditioning factors responsible for the dimorphism of the cocoons. More observations are needed and experimentation will also be necessary. It is desirable that anyone wishing to contribute to our knowledge of *Sphecophaga* have the entire problem clearly in mind so that when a populous and well parasitized hornets' nest becomes available the necessary observations can be made immediately and appropriate experiments undertaken without delay while the early stages of the parasite, including the eggs, are still available. Meanwhile, on the basis of the observations presented in this paper and the comparisons made between the conditions encountered in this

insect with those obtaining in such polymorphic species as *Melittobia,* I feel justified in proposing the tentative hypothesis that: Trophic factors acting upon the larvae condition the determination of *S. burra* individuals into brown cocoon- and white cocoon-spinning forms, of which only the former undergo a diapause.

Literature Cited

MORLEY, CLAUDE. 1911. Ichneumonologica Britannica. IV. Tryphoninae. Printed for the author by H. W. Brown, London.

REICHERT, ALEX. 1911. *Sphecophaga vesparum* Rtzb., eine Schlupfwespe im Wespenneste. Ent. Jahrbuch, Leipzig, 20: 180-182. 1 pl.

SCHMIEDER, RUDOLF G. 1933. The polymorphic forms of *Melittobia chalybii* Ashmead and the determining factors involved in their production. (Hymenoptera: Chalcidoidea, Eulophidae). Biol. Bull. 65: 338-354.

——— 1938. The sex ratio in *Melittobia chalybii* Ashmead, gametogenesis and cleavage in females and in haploid males. (Hymenoptera: Chalcidoidea). Biol. Bull. 74: 256-266.

——— 1939. On the dimorphism of cocoons of *Sphecophaga burra* (Cresson). (Hymenoptera: Ichneumonidae). Ent News 50: 91-97.

SEMICHON, L. 1908. Note biologique sur le *Sphecophaga vesparum* Curtis. Bull. soc. ent. France, pp. 79-81.

Terias palmyra Poey (Lepid.: Pieridae).

Terias palmyra Poey, has not as yet been included in any list of North American butterflies. In Seitz, Vol. V. page 84, is this statement. "*Palmyra* Poey, (= lydia, Fldr.) from Cuba and the Gulf States," etc., etc.

In August 1908 I received from the late W. S. Dickinson, of Miami, Florida, who sent me his season's catch for several years, a male specimen of *Terias* which Mr. Watson, of the American Museum of Natural History, identified as *T. palmyra* Poey. He dissuaded me from announcing it on the grounds that I had not taken it myself.

I have recently received from Mrs. L. E. Forsyth, of Florida City, Florida, a female specimen of *palmyra,* taken by her on Key Large. Both specimens are in my collection.

W. C. WOOD, Mahopac, New York.

Conostethus americanus new species from Colorado, Montana and South Dakota (Hemiptera, Miridae).

By HARRY H. KNIGHT, Iowa State College, Ames, Iowa.

The genus *Conostethus* has not before been reported from North America, although four species are known in Europe. The genus is peculiar in having the third antennal segment permanently curved downward, also in the anteriorly curved front tibiae. The relative lengths of the antennal segments appear to give distinctive characters for separating the species. In the present study the writer has given careful consideration to descriptions of the European species, also having a specimen of *C. salinus* Sahlb. for comparison.

Conostethus americanus new species.

Allied to *salinus* Sahlb., but distinguished by structure of the antennae; segments II and III subequal in length, the male with long hairs on the ventral surface of segment III.

♂. Length 4 mm., width 1.1 mm. Head: width .82 mm., vertex .43 mm.; vertex twice the dorsal width of an eye. Rostrum, length 1.12 mm., just attaining base of hind coxae, pale, the apex black. Antennae: segment I, length .39 mm., thickness .13 mm., black, finely pale pubescent; II, .99 mm., thickness .08 mm., slightly thicker apically, black, pale pubescent; III, .99 mm., thickness .06 mm., distinctly decurved, ventral surface with long pale pubescence, length of hairs exceeding diameter of segment, black; IV, .48 mm., black. Pronotum: length, .47 mm., width at base .99 mm.; basal margin slightly sinuate, lateral margins strongly sulcate sinuate, basal angles produced and slightly reflexed; disk moderately convex, glabrous, black, margins and median line pale, calli distinctly convex. Scutellum fuscous to black, median line pale; mesonotum exposed, fuscous, a pale area on each side.

Hemelytra reaching beyond apex of abdomen, pale translucent, corium and clavus shaded with fuscous, membrane uniformly pale fuscous. Thorax chiefly fuscous, venter fuscous to black, lateral margins greenish yellow. Legs pale to dusky,

base of coxae blackish, hind femora with fuscous above, front and middle femora with a few fuscous dots on posterior aspect; tibiae pale, spines black, front pair strongly curved, the convexity on the dorsal side; tarsi fuscous, pale on basal half.

♀. Length 3.9 mm., width 1.2 mm. Head: width .82 mm., vertex .45 mm.; vertex more than twice the dorsal width of an eye. Antennae: segment I, .30 mm., fuscous to black; II, .86 mm., cylindrical, black; III, .86 mm., more slender than II, slightly curved, black; IV, .47 mm., black. Pronotum: length .47 mm., width at base .95 mm., margins sinuate as in the male. Slightly more robust than the male and paler in color. Head pale, frons with transverse dark lines, base of head, sinuate line on vertex between eyes and spot on base of tylus and apex of frons, blackish. Hemelytra fully developed, paler than in the male, the fuscous shading nearly obsolete. Ventral surface pale to greenish; legs pale, a few dusky points evident on posterior aspect of femora, tips of tarsi black. Front tibiae only very slightly curved.

Holotype: ♂ May 20, 1899; Fort Collins, COLORADO (E. D. Ball); author's collection. *Allotype:* June 2, 1899, Fort Collins, COLORADO (E. D. Ball). *Paratypes:* ♀ May 24, ♂ ♀ May 20, 1899, Fort Collins, COLORADO (E. D. Ball). 2♂ "Colo. 4421." MONTANA—2♂ 9♀ June 20, 1938, Huntley (Wm. Forsyth). SOUTH DAKOTA—♂ 3♀ June 1, 1921, Capa; 2♂, 2♀ May 12, 1922, Capa (H. C. Severin).

Why Study the Senses of Insects?

By CYRIL E. ABBOTT, Harding College, Searcy, Arkansas.

If, tomorrow, someone should discover an eyeless butterfly that frequents flowers, it would be possible to describe, without even seeing a specimen, certain pecularities of the species. It would be found to possess large and peculiarly modified antennae and palpi. One, perhaps both of the sexes, would have well developed scent glands. It might have tympana. It would be modest in coloring. It would fly on dull days as well as sunny ones; it might even fly at night. Mating would take

place as a result of olfactory stimuli, and there would be no elaborate courtship. For the bionomics and behavior of a given species of insect depends upon its sensory equipment, so that the insect lacking in one sense has at least one of the others highly developed. At least this is true of terrestial and aerial insects.

For example, insects which have high visual acuity generally have poorly developed chemical senses and *vice versa*. Although, generally speaking, the Diptera and many Hymenoptera are exceptions to this statement, there are exceptions even to these exceptions. Thus the Asilidae give little evidence of olfactory powers, while the poor eyesight of ants is well known. Insects with auditory powers often have weaker vision than those that do not. The Noctuidae, which have tympana, have lower visual acuity than the deaf Sphingidae. Thus one is entirely justifiel in making the statement that, given a complete analysis of the senses of a given insect, he can, within reasonable limits, predict the behavior of that species.

The extent to which behavior may be analyzed is excellently illustrated by predatory insects with binocular vision. Because it is necessary for the compound eyes to be simultaneously in use to fix the position, and especially the distance of its prey, the predator must be able to move its eyes, its head, or its entire body very quickly. Since the eyes of insects are fixed, predatory insects either have highly mobile heads (mantids, dragonflies, and certain Hymenoptera) or are able to move the whole body very quickly.

Incidentally, the necessity of binocular vision for the capture of prey is easily demonstrated by covering one eye of a mantis with opaque varnish. Although the animal so treated will "strike" at flies and other moving objects, its "aim" is so poor that any success it enjoys is the result of accident, so that unless relieved, it will starve to death in the midst of plenty.

The behavior of predators without mobile heads is illustrated by the behavior of the Cincindelidae. These beetles make their captures by means of a "head on" rush. When pursued, the tiger beetle generally alights facing its pursuer, for it is in

this way only that it can determine the distance of its enemy.

A study of insect senses enables one to interpret behavior complexes. Why is it practically impossible to induce butterflies to mate in captivity? Because butterflies, depending as they do upon vision for the majority of their sensuous stimuli, mate during, or soon after, flight. Moreover their mating is preceded by a complex courtship which seems to depend, again, chiefly upon visual stimuli. This probably accounts in part for the brilliantly distinctive markings of butterflies. Mating involves not only recognition of the opposite sex, but also of the appropriate species. That this recognition is imperfect is revealed by the frequency with which males of one species attempt to mate with females of a similar species. Moths, on the other hand, perhaps because they are mostly nocturnal, depend upon their chemical sense for the selection of mates. All this indicates that one need invoke neither "instinct" nor a "physico-chemical mechanism" to describe and interpret behavior; a knowledge of the senses involved, combined with a little common sense, are all that are required.

A knowledge of insect senses enables one to indicate the origins of such behavior. For countless generations dragonflies have started life as aquatic animals. Even the adults are sensitive to water vapor, while their great eyes are doubtless responsive to the light reflected from extensive water surfaces. Is it any wonder, then, that the female dragonfly, in spite of her aerial habit, deposits her eggs in the water? The adult cabbage butterfly (*Pieris rapae*) does not feed upon cabbages, but that does not prevent the female from being sensitive, both visually and chemically, to cabbages, to the extent of depositing her eggs thereon.

Even developmental processes may be interpreted on the basis of changes in the sensory equipment of the insect. The larvae of *Gyrinus* have filamentous antennae, while in the adult the antennae are highly modified, "shoe-shaped" structures. The submerged larva depends upon vision plus, possibly, a chemical sense, for the capture of its prey. The adult beetle seldom leaves the surface of the water excepting to escape enemies. It de-

pends upon vibrations of that surface both for the capture of prey and the avoidance of enemies; vibrations transmitted through specialized chordotonal organs located in the antennae. The antennae of the adult also warn it of its approach to any large object projecting from the water, so that it may avoid collision with the same.

Obviously senses are correlatel with the morphology, physiology, and ecology of the insect. The eyes of dragonfly larvae which inhabit the muddy river bottom are rather different from the eyes of those clinging to water plants. Some surface-inhabiting Hemiptera have the ommatidia on the dorsal surfaces of the eyes smaller and more numerous than those on the ventral surface. Doubtless the visual acuity of the dorsal area is greater than that of the ventral portion.

A study of insect senses enables one to help control noxious species. The destruction of the Japanese beetle through traps baited with geraniol and the killing of houseflies through the attractive yet toxic action of formaldehyde are familiar proofs of the efficacy of such knowledge. On the other hand, I have seen blowflies alight upon meat dipped in a formalin solution strong enough to prove irritating to the onlooker.

The possible effects of irritants upon insects has not received sufficient attention. It has been my observation that mosquitoes are repelled chiefly by irritants. It is a recognized fact that heat radiation alone is sufficient to initiate the feeding responses of mosquitoes. In view of this, a great number of substances which are noisome merely, and which have been generally recommended as repellent, are totally inadequate as protection against mosquito attacks. (The best repellent to date appears to be pine tar mixed with an equal quantity of tallow. Though slightly irritating to the human skin, it is not dangerous or unduly uncomfortable to use. Besmeared with this substance I have slept unannoyed and safe although surrounded by mosquitoes!)

In contrast to the mosquitoes, the stable fly, (*Stomoxys calcitrans*) does not respond to heat radiation, but to the odor of perspiration, so that a merely malodorous repellent may prove effective against this species.

In answer, then, to the query as to value of the study of insect senses, one might reply: "He who is thoroughly acquainted with the morphology anl physiology of the sense organs of a given species of insect, is thoroughly acquainted with that species of insect."

Observations on Parasitism and Superparasitism (Lepid.: Sphingidae; Hymen.: Braconidae, Chalcididae).

By C. Brooke Worth, Swarthmore College, Swarthmore, Pennsylvania.

In September, 1938, I found a catalpa tree (*Catalpa bignonioides* Walt) at Swarthmore, Pennsylvania, infested with caterpillars of the catalpa sphinx, *Ceratomia catalpae* Boisduval. More than half of the caterpillars were doomed, bearing variable numbers of cocoons of the braconid wasp, *Apanteles congregatus* Say.

At random, I collected twenty-three caterpillars fourteen of which already bore braconid cocoons. Subsequently five more "broke out" with braconid larvae, so that only four of the original twenty-three were unparasitized. This survival rate for the sphinx caterpillars, 17%, might have been still lower, had the four unparasitized ones not been protected from wasps during their last caterpillar days in my vivarium.

The nineteen parasitized caterpillars brought forth a total of 1346 braconid cocoons. These were distributed among the host caterpillars as follows:

Host No.	No. Cocoons	Host No.	No. Cocoons
1	2	11	57
2	10	12	59
3	11	13	59
4	19	14	60
5	23	15	64
6	38	16	65
7	42	17	83
8	45	18	113
9	51	19	295
10	52	Dropped off	198
		Total	1346

These cocoons yielded approximately equal numbers of braconid wasps (kindly identified for me by Mr. Hopper at the Academy of Natural Sciences) and superparasites belonging to the family Chalcididae.

The average degree of infestation is 71 cocoons per caterpillar, but the mean, in the actual cases, falls closer to 60. I suspect on the basis of these figures that the average *A. congregatus* female lays about sixty eggs within the sphinx caterpillar. If this be so, caterpillar No. 18 was parasitized by two wasps, while No. 19 was the victim of no less than five.

The cocoons were usually disposed laterally on the caterpillar, the larvae boring their way out along the line of the spiracles. In cases of very heavy infestation, the dorsal surface of the host also bore an abundance of cocoons. The ventral surface was always free of them.

The emergence of the larvae was always attended by great loss of "blood" in the hosts. They seemed never to recover from the shock, becoming very sluggish, and appearing weak and deflated. About half died before their burden of cocoons hatched; the other half were still alive, technically speaking, at this time but were unable to move. All the caterpillars died *in situ,* that is, clinging to a midrib or large vein on the ventral surface of a leaf; this circumstance is probably essential to the successful hatching of the cocoons.

The cocoons hatched about a week after the wasp larvae had emerged from the caterpillars. The hatching wasps cut the tops off the cocoons very neatly, producing perfect hemispherical lids which remained attached at one point by a few silken strands. Once able to lift the lid, a wasp would fairly burst out of its cocoon, running actively about the vivarium at once and very shortly taking flight.

Among the *Apanteles* wasps there were equal numbers of males and females. One could therefore expect 336 females to be on the look-out for young catalpa caterpillars in the summer of 1939. The chalcids, however, were all females, presumably experiencing a parthenogenetic generation in September. There would therefore be twice as many females of this species (that

is, 673) on the look-out for *parasitized* young catalpa caterpillars in the summer of 1939. We may suppose, casually, that it is twice as hard for this species of chalcid to fulfill its life cycle as it is for the braconid species, for the chalcid's search for a properly prepared place to lay its eggs is more highly specialized.

The four unparasitized catalpa caterpillars in my vivarium died. Had they lived, and had half of them been females (which is the most reasonable assumption), each of the two potential mothers would have to lay 202 eggs in 1939 (for 336 would fall prey to braconids, and only 17%, or 69, would survive).

But if these two females left 69 surviving descendants in 1939, the population of caterpillars would be increasing at the rate of 1625% per year. The same reasoning would account for a similarly great increase of braconids and chalcids. It is safe to predict that no such thing will occur.

We have assumed that all the wasps will be on hand next summer and that for this reason the moths will have to lay a large number of eggs. If we were to eliminate some of the wasps, the moths would not have to be so reproductive. During the winter the wasps conceal themselves in crevices of the bark of trees and in other such hiding places. A brown creeper, the stomach of which I examined in midwinter, contained an abundance of fresh insect remains; it is likely that hibernating wasps will be consumed by creepers, nuthatches, titmice, and other small insectivorous birds. In Fall and Spring many are probably caught in flight by swallows, flycatchers, and swifts, while some undoubtedly end their lives miserably in spiders' webs. A few others may fail to find a suitable colony of caterpillars to parasitize, or they may not find mates at the proper time.

The question arises: how extensive is this decimation of braconids and chalcids? Returning to the catalpa moths for the answer, let us stabilize their population by allowing them neither to increase nor decrease during the coming season—this time next year there must be only four surviving caterpillars from any four pupae which are safely underground now. If the braconids parasitize the same percentage of larvae next

summer as in 1938, the four surviving larvae in 1939 will have to witness the parasitization of 19 of their siblings. This means that each female pupa in the ground at present will have to lay 12.5 eggs next Spring in order to ensure the production of one female descendant which will survive the onslaughts of braconids.

Allowing this figure to stand for a moment, we see that this is only 5.7% of the number of eggs the moths would have had to lay to satisfy the braconids, had *they* all survived. This means that 94.3% of the 1938 braconids will have to be destroyed before the summer of 1939 if the populations of both moths and wasps are to remain constant.

The moths, however, will lay more than 12.5 eggs apiece. It must be presumed, therefore, that the race of *C. catalpae* experiences lethal environmental factors other than parasitism by braconids. An excess of individuals must be provided for destruction by other agencies, which might include parasites of the eggs, eaters of eggs and caterpillars (such as birds), bacterial and other diseases of the caterpillars, shortage of food supply (as when a tree becomes defoliated), accidents to the pupae, and destruction of imagines before mating or completion of egg laying has occurred.

It would be interesting to count the exact number of eggs laid by *C. catalpae,* to find what proportion of their reproductivity is essential to sustaining the braconid population. This figure is represented by the fraction:

$$\frac{12.5}{\text{Number of eggs}}$$

Conclusions.

1. In a single case, caterpillars of *Ceratomia catalpae* were parasitized by *Apanteles congregatus* to the extent of 83%.
2. In a single case, larvae of *Apanteles congregatus* were parasitized by a species of Chalcididae to the extent of 50%.
3. *Apanteles congregatus* usually lays about 60 eggs.
4. The mortality of *Apanteles congregatus,* before completing the reproductive cycle, is estimated at 94.3%.
5. The species of Chalcididae mentioned is estimated to a)

experience a mortality twice as great as that of the braconid, or b) lay only half as many eggs, or c) lay half its eggs in caterpillars which have not been parasitized by braconids, or d) be partially eliminated in some other way.

6. The braconid scourge is only a small part of the mortality experienced by *C. catalpae* in the various stages of its metamorphosis.

A Note on the Fabrician Species lycaste (Lepidoptera: Ithomiinae).

By RICHARD M. FOX, Academy of Natural Sciences of Philadelphia.

Recently I was confronted with the perplexing problem of the identity of the species *lycaste* Fabricius[1]. Since this name has been a source of uncertainty and controversy, it might be well to review here its history and synonymy, and to record my conclusion regarding the form which Fabricius intended to describe.

The original description is ambiguous and, as Dr. Holland pointed out[2], "might apply to a number of species." The following is my translation of the Latin text:

> "P(apilio) H(elliconius lycaste). The elongated wings completely tawny to the black apex: forewing with a golden yellow maculation. Figured by Jones, II, pl. 7, fig. 1 as Papilio lycaste. Habitat (unknown). In Drury's private collection (*Mus. Dom.*). Small. Head black, spotted with white. Thorax tawny. Abdomen ashen. Forewings tawny at the base with a black median spot, followed by bright yellow, the black apex with several yellow spots. Hindwings tawny with a black apex."

According to Butler[3] South American specimens from Mr. Milne's collection were associated in the British Museum with the name *lycaste*. Reference again is made to the Jones drawing, "This species is figured in the unpublished 'Icones' of Mr.

[1] Fabricius, Ent. Syst., III, p. 161 (1793).
[2] Holland, Butterfly Book, revised edition, p. 72 (1931).
[3] Butler, Cat. Fab. Diur. Lep. B. M., p. 126 (1869).

Jones, now in the possession of F. Dawtry Drewitt, Esq., Christ's College, Oxford." In the preface to the same work, J. E. Gray said[4], "The Museum, also contains, by purchase at Milne's, Strothard's and other sales, several specimens which originally formed parts of Mr. Drury's collection and are types from which Fabricius described other species . . . Fabricius described some hundred species from a series of drawings made chiefly from his own collection by the late Mr. Jones of Chelsea . . . Fabricius always quoted these drawings as Jones's 'Icones.' They were formerly lent to the Museum and Mr. Doubleday named part of the Museum collection from them . . . notes and sketches were made from them for the use of this 'Catalogue,' thus enabling the Museum specimens to be named from a comparison of the original drawings."

To that time there seemed to be little doubt in the minds of students as to the identity of *lycaste*. But as collections grew, the Ithomiinae came to be recognized as a confusing complex of similarly marked species, and the brief Latin descriptions by the early workers no longer were sufficiently precise. Reakirt attempted to further illuminate *lycaste* and to throw into relationship with it various forms then recently described by continental authors[5]. His description of "typical *lycaste*," however, is that of a male *panamensis* Bates[6]. Subsequent authors, including Kirby, Scudder, Haensch and others, followed Reakirt in his error.

Dr. Holland published on plate VIII of the "Butterfly Book" a figure concerning which he says in the revised edition[2]: "In the first edition of this book this insect was named "*Ceratinia lycaste* Fabricius." At the time I hastily accepted Reakirt's determination as correct, but long since discovered my mistake. The insect which Reakirt called *lycaste* Fab. and attributed to California, is undoubtedly *Ithomia anaphissa* H.-S.[7], a Central American insect." It is curious to note that Reakirt's determination did not agree with his own description.

[4] Butler, op. cit., pp. iii-iv.
[5] Reakirt, Proc. Ent. Soc. Phila., V, pp. 218-222 (1865).
[6] Bates, Proc. Zool. Soc. Lond., p. 244, pl. 29, f. 5 (female) (1869).
[7] Herrich-Schaeffer, Coord. Regensburg, XVIII, p. 177 (1864).

The revised edition of the "Butterfly Book" includes a reproduction of the Jones 'Icones' figure[8]. While the Fabrician description applies to it perfectly, both the picture and the description resemble the eight forms named below:

Phyciodes quintilla (Hewitson)[9].
Heliconius clara Fab.[1].
Heliconius metaphorus Weym.[10].
Ithomia panamensis Bates[6].
Mechanitis macrinus Hew.[11].
Ceratinia azara (Hew.)[12].
Hypothyris philetaera (Hew.)[13].
Hypothyris megalopolis (Fld.)[14].

Most of these can be eliminated promptly. The position of the cubital on the primaries in the Jones figure, as well as the lack of marginal dots on the secondaries precludes *P. quintilla. H. clara* has too many black median spots, while the marginal dots of the primaries are placed differently from the Jones figure. Also the cells of the secondaries of *Heliconii* are far shorter than the cell of the 'Icones' drawing. *H. metaphorus,* further, has a narrower black marginal area on the hindwing. *I. panamensis* differs in that there are always yellow streaks in the black apical region of the primaries, the marginal dots are white, those at the apex being far smaller than the analagous marks of the Jones figure. In *M. macrinus* the female resembles the Jones illustration, but the marginal black of the secondaries is narrower and the marginal dots at the apex of the primaries are fused into a streak. *C. azara* has three median black marks on the primaries, and a single large yellow apical spot, while the colors are greyer and more transparent than the opaque Jones figure. *H. philetaera* closely resembles the Jones figure, the secondaries and the marginal dots being nearly identical; but the distal edge of the yellow area is more irregular than the Jones figure, and is placed nearer the apex.

[8] Holland, op. cit., pl. LXXII, f. 2.
[9] Hewitson, Exot. Butt., V, p. 30; pl. XV, f. 23 (1872).
[10] Weymer, Ent. Zeit. Stett., XLV, p. 24; pl. 2, f. 1 (1864).
[11] Hewitson, op. cit., II, p. 29; pl. 15, f. 11 (1860).
[12] Hewitson, op. cit., 1, p. 26; pl. 13, f. 23 (1853).
[13] Hewitson, op. cit., V, p. 24; pl. 12, f. 230 (1875).
[14] C. & R. Felder, Reise Nov., Lep., III, p. 360; II, pl. 44, f. 9 (1865).

Also *philetaera* has three median spots which are sharply angular rather than roundish.

It will be noted that the above elimination is based on the assumption that the 'Icones' figure of *lycaste* is an accurate representation of the specimen which Fabricius called *lycaste*,— accurate with respect to pattern and wing shape.

There are before me six examples of *Hypothyris megalopolis* which are remarkably similar to the Jones drawing of *lycaste*, except for the body length, which Holland suspected was misdrawn[2]. This is the one point at which I am willing to concede inaccuracy on Jones' part, for the shape of the wings, the length of the antennae and such venation as is indicated in the figure certainly belong to an Ithomiine. In all of these respects, as well as in maculation and coloring. the figure agrees with *megalopolis*. One specimen, a male sent to me by R. Q. Bliss and collected July 11, 1937 at Ft. Kobbe, Panama Canal Zone (this example is now in the A. N. S. P. collection), is nearly identical with the Jones' figure. Of the six specimens, the one just mentioned has no trace of yellow, except the marginal dots, in the black apical area; the other five are marked only very slightly with tiny points of yellow, never approaching the large streaks of *panamensis*.

Because of this close agreement with the 'Icones' illustration, in addition to the fact that the Fabrician description fits, I am convinced that Fabricius had before him when he described *lycaste* an example of the form later described by C. and R. Felder as *megalopolis*. Consequently the Felder name falls as a synonym before *lycaste* Fabricius. Of the names applied to the group of forms which Reakirt wrongly associated with *lycaste*, *iphianassa* Doubleday and Hewiston[15] is the oldest and becomes the specific name.

[15] Doubleday, Hewitson & Westwood, Gen. Diurn. Lep., p. 127; pl. 18, f. 3 (1847).

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of **Entomological News for 10c.** The number of, or annual **volume,** and in some cases the part, heft, &c., the latter **within ( )follows; then** the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—**Anon.**—Entomological origin of the fleur-de-lis. [Ward's Ent. Bull.] 6, No. 5: 1. Department of Entomology. [Ann. Rep. Colo. Mus. Nat. Hist.] 1938: 39-40. Conseils pour la preservation des collections. [Lambillionea] 1939: 36-38. **Beckdorf, M.**—In den Pilzgarten der Atta. [Das Flussmeer] 1939: 62-74, ill. (S). **Britton, W. E.**—Additions to the check-list of the Insects of Connecticut. [Conn. Geol. & Nat. Hist. Surv.] Bull. No. 60: 169pp. **Carpenter, F. M.**—The lower Permian insects of Kansas. Part 8. [Pro. Amer. Acad. Arts & Sci.] 73: 29-70, ill. **Cockerell, T. D. A.**—Natural history of Santa Catalina Island. [Sci. Monthly] 1939: 308-318, ill. **Costa Lima, A. da.**—Insectos do Brasil. 1: 470 pp. ill. (K). **Debauche, H.**—Nouvelle méthode d'imprégnation des cellules nerveuses par le nitrate d'argent. [Ann. Soc. Sci. Bruxelles] 59: 23-27, ill. **Geary, N.**—Some habits of an assassin bug (Ptilocnemus femoralis). [Australian Mus. Mag.] 6: 351-353, ill. **Hatch, M. H.**—A bibliographical catalogue of the injurious arachnids and insects of Washington. [Univ. Wash. Publ. Biol.] 1: 163-224. **Hetrick, L. A.**—Preserve life history specimens in this gelatin-formaldehyde preparation. [Ward's Ent. Bull.] 6, No. 5; 4. **Holdhaus, K.**—Verschiedenartige Verbreitungsbilder unter den borealpinen insekten Europas. [Forsch. und. Fortschritte] 15: 81-83. **Holloway, J. K.**—An agar preparation for feeding adult parasite insects.

[12] 32: 154. **Hyslop, J. A.**—Giving meaning to the terms, brood and generation. [12] 31: 557-559. **Kurz, H.**—Opportunities for research in Florida [Proc. Fla. Acad. Sci.] 1: 7-16. **Lal, K. B.**—Parasitism in insects. [Current Sci., Lahore] 8: 55-59. **Martynov, A. B.**—Fossiles Insectes. [Trav. Inst. Paleontolog. Acad. Sci. USSR] 7: 7-80, ill. (Russian with English summary). **Maulik, S.**—A method of storing small specimens in alcohol. [Mus. Jour., London] 38: 570-574, ill. **Mohr, C. E.**—I explore caves. [Natural History] 43: 190-204, ill. **Nuttall, G. H. F.**—Obituary. By V. L. Yakimov. [Priroda] 1938, No. 11-12: 169-171. **Pough, F. H.**—The spider and the fly. [Natural History] 43: 220, ill. **Smith, R. C.**—Annual insect population records, with special reference to the Kansas Summary. [12] 31: 618-622. Some phases of entomological writing from the viewpoint of the reader. [12] 31: 563-565. **Swezey, O. H.**—Misidentity of immigrant insects in Hawaii. [Pro. Hawaiian Acad. Sci.] B. P. Bishop Mus. Sp. Publ. 33: 6-7. **van der Vecht, J.**—Het bewaren van insectenverzamelingen in de Tropen. [Ent. Med. Ned.-Indie] 4: 58-62, ill. **Vickery, R. A.**—Obituary. By O. I. Snapp. [12] 31: 637, ill. **Weiss & Carruthers.**—Insect enemies of books. [N. Y. Public Library] 1937: 63 pp., ill. **Whitehead, F. E.**—A proposed national contest for entomology students. [12] 31: 566-568.

ANATOMY, PHYSIOLOGY, ETC.—Ancona, H. L.—Histologia de la glandula venenosa de Crypsidromus breyerii. [Ann. Escuela Nac. Cien. Biol.] 1: 107-118, ill. **Balli, A.**—Longevita e perdita in peso negli adulti del Bombyx mori. [Mem. Soc. Ent. Italiana] 16: 115-123. **Becker, W. B.**—Larval development of the native elm bark beetle, Hylurgopinus rufipes in Massachusetts. [12] 32: 112-121, ill. **Berry, R. O.**—Observations on chromosome elimination in the germ cells of Sciara ocellaris. [Pro. Nat. Acad. Sci. U. S. A.] 25: 125-127, ill. **Chadwick, L. E.**—The axillary and subalar muscles in certain families of Lepidoptera. [Jour. Colo.-Wyom. Acad. Sci.] II: 47. **Debaisieux, P.**—Organes sensoriels de la tete d'asticots (Lucilia sericata). [Ann. Soc. Sci. Bruxelles] 59: 9-22, ill. **Debauche, H.**—See under general. **DeJong, J. K.**—The influence of the quality of the food on the egg-production in some insects. [Treubia] 16: 445-468. **Duncan, C. D.**—See under Hymenoptera. **Fischer-Wasels, B.**—Die Bedeutung der Erblichkeits-Faktors in der Geschwulstentwicklung. [Forsch. und

Fortschritte] 15: 83-84. **Heuser, R.**—Die kulturbedingte Parzellierung der Landschaft und das häufigere Auftreten melanotischer Formen bei Schmetterlingen. [Mitt. Saarp. Ver. fur Nat. & Naturs. Pollicbia] 7: 261-266. **Hoh, H.**—The abnormal and characteristic behavior of the sex-chromosome in Locusta migratoria. [Trans Sapporo Nat. Hist. Soc.] 15: 247-253, ill. **Jacobi, E. F.**—Ueber lebensweise, auffinden des wirtes und reguliering der individuenzahl von Mormoniella vitripennis. [Arch. Néerland. Zool.] 3: 197-282, ill. **List, G. M.**—The effect of temperature upon egg deposition, egg hatch and nymphal development of Paratrioza cockerelli. [12] 32: 30-36. **Maneval, H.**—La ponte ovovivipare de Chrysochloa viridis. [Misc. Ent.] 39: 99-101, ill. **Omura, S.**—Studies on the reproduction system of the male of Bombyx mori. II. Post-testicular organs and post-testicular behaviour of the spermatozoa. [Journ. Fac. Agr. Hokkaido Imp. Univ.] 40: 129-170, ill. Structure and function of the female genital system of Bombyx mori, with special reference to the mechanism of fertilization. [Jour. Fac. Agr. Hokkaido Imp. Univ.] 40: 111-128, ill. **Paramonow, S. J.**—See under Diptera. **Reichensperger, A.**—Bemerkungen über den geschlechtsdimorphismus der Paussiden. [Decheniana] 97 (B): 126-131, ill. **Savitskaya, Z.**—The dynamics of the water and fat in insect body in connection with its cold-resistance. [Rep. Inst. Zool. & Biol. Acad. Sci. Ukrainian SSR] No. 5: 159-160. (Russian with English summary). **Schnell, R.**—Les divers degrés de l'action cécidogène dun insecte, Adelges abietis. [Bull. Mensuel Soc. Linn. de Lyon] 7: 201-202. **Taranukha, M.**—The feeding rates of Porthetria dispar in natural conditions. [Rep. Inst. Zool. & Biol. Acad. Sci. Ukrainian SSR] No. 5: 99-102. (Russian, English summary). **Treyman, F.**—The number of caterpillars hatched from eggs of gypsy-moth and their survival at an early age, depending on the feeding conditions of the maternal generation. [Rep. Inst. Zool. & Biol. Acad. Sci. Ukrainian SSR] No. 5: 138-144. (Russian with English summary). **Wieting & Hoskins.**—The olfactory responses of flies in a new type of insect olfactometer. [12] 32: 24-29, ill. **Woodhill, A. R.**—Salinity tolerance and pH range of Culex fatigans, with notes on the anal papillae of salt-water mosquitoes. [Pro. Linn. Soc. N.S.W.] 63: 273-281. **Yemchuk, E.**—Catalase dynamics in Porthetria dispar and Dendrolimus pini during development. [Rep. Inst. Zool. & Biol. Acad. Sci. Ukrainian SSR]

No. 5: 177-180. (Russian with English summary). **Zavrel, J.**—Geechlechtsdimorphismus der Chironomidenlarven und-puppen. [Publ. Fac. Sci. Univ. Masaryk] Cis. 257: 23 pp., ill.

ARACHNIDA AND MYRIPODA.—**Anon.**—Insect-infesting mites. [Ward's Ent. Bull.] 6, No. 5: 2. **Ewing, H. E.**—A revision of the mites of the subfam. Tarsoneminae of North America, the West Indies, and the Hawaiian Islands. [U.S.D.A.] Tech. Bull. No. 653: 66 pp., ill. (K*). **Exline, H.**—The Araneida of Washington: Agelenidae and Hahniidae. [Univ. Wash. Pub. Biol.] 9: 1-44, ill. (K*). **Jacot, A. P.**—New mites from the White Mountains. [Occ. Pap. Boston Soc. Nat. Hist.] 8: 321-332, ill. (*). **Kaston, B. J.**—Check-list of the spiders of Connecticut [Conn. Geol. & Nat. Hist. Surv.] Bull. No. 60: 175-201. **Langeron, M.**—Repertoire d'espèces et de genres nouveaux Acariens. [54] 17:95. **Remlinger & Bailly, J.**—Contribution a l'etude experimentale des accidents determines par la tique du Chien (Rhipicephalus sanguineus). [54] 17: 1-3.

THE SMALLER ORDERS OF INSECTS.—**Ghidini, G. M.**—La presumibile funzione delle spugne legnose nei nidi dei Metatermitidi. [Riv. Biol. Colon., Roma] 1: 261-267, ill. **Hoppe, G. N.** —Plecoptera of Washington. [Univ. Wash. Publ. Biol.] 4: 139-174, ill. (K*). **Robert, A.**—Notes sur les Odonates de nominigue. Lestes eurinus et Enallagma vesperum dans le Québec. [Le Natur. Canadien] 66: 47-64. **Townsend, L. H.**—Lacewings and their allies. [Sci. Monthly] 1939: 350-357, ill.

ORTHOPTERA.—**Alexander, G.**—Morphological variations in Acrididae correlated with altitude. [Jour. Colo-Wyom. Acad. Sci.] II: 46. **Ebner, R.**—Orthopterorum Catalogus. Pars 2. Tettigoniidae. Subfam. Hetrodinae, Acridoxeninae. p. 73-94. **Günther, K.**—Revision der Acrydiinae I. [Mitt. Zool. Mus. Berlin] 23: 299-437, ill. (K). **Hebard, M.**—An ecological survey of the Orthoptera of Oklahoma. [Okla. A. & M. Coll. Agr. Exp. Sta.] Tech. Bull. 5: 31 pp., ill. **Schiuma, R.**—Informe sobre "Tucuras." [Minist. Agric. Rep. Argentina] Publ. Misc. 43: 117 pp., ill. (S). **Urquhart, F. A.**—The American locust (Schistocerca americana) in Ontario. [Can. Field-Nat.] 53: 24-25.

HEMIPTERA.—Blött, H. C. —Catalogue of the Coreidae in the Rijksmuseum van Natuurlijke Historie. Coreinae. [Zool. Mededelligen, Leiden] 20: 275-308, ill. (*S). **Davidson & DeLong.**—Studies of the genus Empoasca (Cicadell.). [Ohio Jour. Sci.] 39: 110-118. (*). **Drake & Poor.** —Los Tingitidae. [Notes Mus. de la Plata] 3 (Zool.): 103-109, ill. (*). **Ferris & Usinger.**—The family Polyctenidae (Heteropt.). [Microent.] 4: 50 pp., ill. (K*). **Palmer, M. A.**—Some aphid puzzles. [Jour. Colo.Wyom. Acad. Sci.] II: 80.

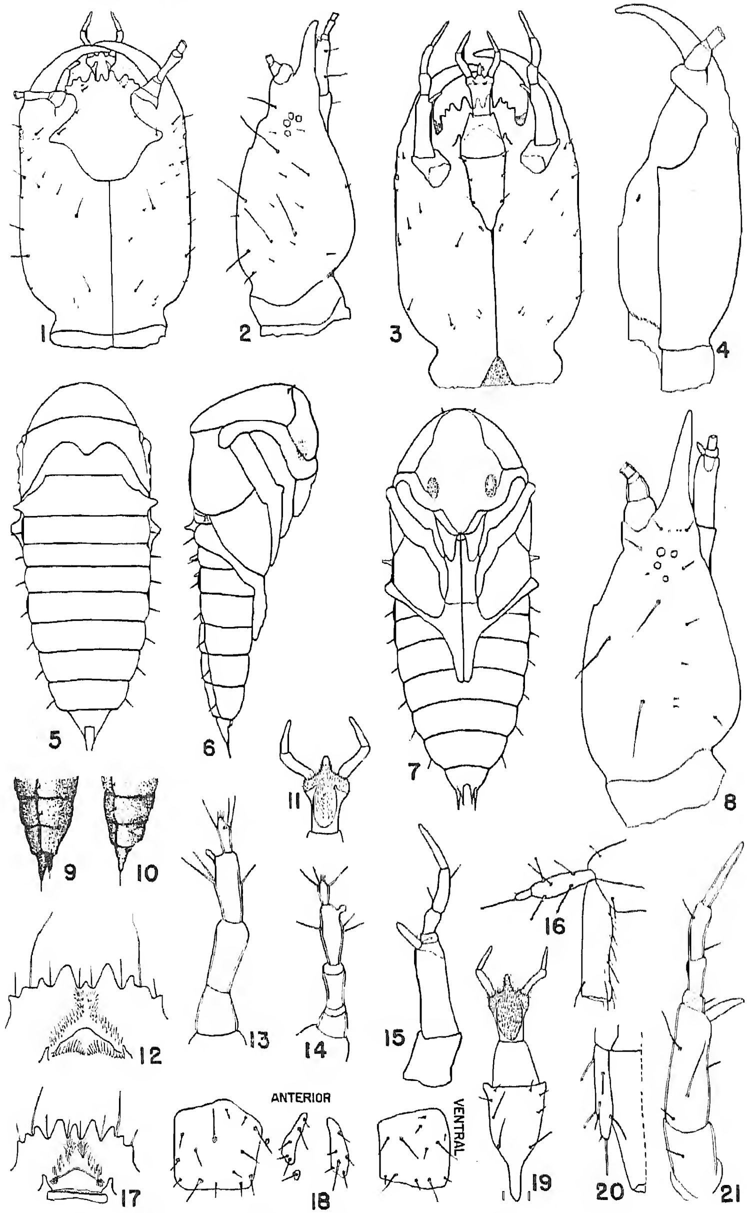
LEPIDOPTERA.—d'Alemida, R. Ferreira Revisão do genero Anteos (Pierid.). [Mem. Inst. Oswaldo Cruz] 33: 567-579, ill. (S). **Bates, M.**—Notes on Cuban butterflies. [115] 13: 4 pp. **Chadwick, L. E.**—See under Anatomy. **Forbes, W. T. M.**—Sex differences in Lepidoptera. [Ward's Ent. Bull.] 6, No. 6: 1-2, ill. **Heuser, R.**—See under Anatomy. **Knowlton, G. F.**—Lepidoptera. [Utah Agr. Exp. Sta.] Mimeog. Ser. 200: 14 pp. **Schwanwitsch, B. N.**—On the stereoeffect of cryptic colour-patterns in Lepidoptera. [Comptes Rend. Acad. Sci. USSR] 21: 179-182, ill.

DIPTERA.—Adamson, A. M.—Observations on biting sandflies (Ceratopogonid.) in Trinidad, British West Indies. [Trop. Agric., Trinidad] 16: 79-81. **Bartlett, K. A.**—The dung rolling beetle as a host of a Sarcophagid parasite. [12] 32: 150. **Dampf, A.**—Un nuevo Phlebotomus (Psychod.) procedente de Texas. [Ann. Escuela Nac. Cien, Biol.] 1: 119-132, ill. (*). **Debaisieux, P.**—See under Anatomy. **Huckett, H. C.**—Descriptions of new North American Anthomyiidae belonging to the genus Pegomyia. [1] 65: 37 pp., ill. **James, M. T.**—The evolution of a dipterous wing. [Jour. Colo.-Wyom. Acad. Sci.] II: 79. **Lopes, H. deSouza.** — Sobre um Rhinophoridae e varios Sarcophagidae da collecão do "Deutsches Entomologishes Institut" em Berlin-Dahlen. [Mem. Inst. Oswaldo Cruz] 33: 555-565, ill. (S). **Paramonow, S. J.**—Kritische uebersicht der gegenwartigen und fossilen Bombyliiden-gattungen (Dipterder ganzen welt. [Rep. Inst. Zool. & Biol. Acad. Sci. Ukrainian SSR] No. 23: 48-86. (Russian with English summary.) Ein grundriss der biologie, der verbreitung und der ökonomischen bedeuting der Bombyliiden (Diptera). [Rep. Inst. Zool. & Biol. Acad. Sci. Ukrainian SSR] No. 23: 87-100, ill. (Russian with English summary).

Rogers, J. S.—Two larval crane-fly members of the Neuston Fauna. [Pro. Fla. Acad. Sci.] 1: 154. **Sturtevant, A. H.**—On the subdivision of the genus Drosophila. [Pro. Nat. Acid. Sci U. S. A.] 25: 137-141. **Zavrel, J.**—See under Anatomy.

COLEOPTERA.—Benick, L.—Brasilianische Steninen (Staph.) [74] 16: 146-164, ill. (*K). **Chagnon, G.**—Contribution a l'étude des Coléoptères de la Province de Québec. [Le Natur. Canadien] 66: 38-46, ill. (K). **Fisher, W. S.**—New neotropical Buprestidae. [74] 16: 111-145. (*). **Hatch, M. H.**—Coleoptera of Washington: Carabidae: Cicindelinae. [Uni. Wash. Pub. Biol.] 1: 225-240, ill. (K*). **Hustache, A.**—Erodiscus Schonh. Sud-Américains. (Curculion.). [Bull. Mensuel Soc. Linn. de Lyon] 7: 192-200. (K*). Ceratopinae Sud-Americains (Curculion). [Misc. Ent.] 39: 89-99. (SK*). Zygopinae de L'Amerique Meridionale. [74] 16: 58-82. (*S). **Larsson, Sv. G.**—Der Lebenszyklus der Carabiden Statistik als Hilfsmittel biologischer untersuchungen. [34] 125: 87-90.

HYMENOPTERA.—Anon.—Ueber den Parasitismus der Hymenopteren. [Verh. Schwiezer. Naturf. Gesell.] 119: 11-27, ill. **Bequaert, J.**—The oriental Vespa analis and its color forms with a note on the synonymy of Vespa esakii and Vespa formosana. [1] 65: 37-42. **Duncan, C. D.**—A contribution to the biology of North American Vespine wasps. [Stanford Univ. Pub. Biol. Sci.] 8: 272 pp., ill. **LeVeque, N.**—Experiences with taxonomic studies of carpenter bees. [Jour. Colo.-Wyom. Acad. Sci.] II: 44. **Marelli, C. A.**—Un microhimenóptero Proctrotrupoideo Telenomus almanzoii n. sp., de la fam. Scelionidos parasito de los desoves del bicho quemador, Hylesia nigricans. [Mem. Jardin Zool.] 7: 161-174. (*S). **Moczar, L.**—Beobachtungen über den Nestbau einiger Odynerus-Arten. [34] 125: 70-80, ill. **Statz, G.**—Neue Funde parasitischer Hymenopteren aus dem Tertiär von Rott am Siebengebirge. [Decheniana] 98 (A): 71-144, ill. **Weyrauch, W.**—Wie ein Wespennest entsteht (Nach versuchen und beobachtung en an Vespa vulgaris & V. germanica). [88] 27: 73-77. **Zirngiebl, L.**—See under Special in ENT. NEWS for June, 1939.



IMMATURE STAPHYLINIDS, GENUS QUEDIUS.—VORIS.

ENTOMOLOGICAL NEWS

VOL. L. JUNE, 1939 No. 6

Immature Staphylinids of the Genus Quedius (Coleoptera: Staphylinidae*).

By RALPH VORIS, Southwest Missouri State
Teachers College Springfield, Missouri.

(Plate I.)

The larvae of the genus *Quedius* are small to medium sized, campodeaform; urogomphus short, confluently not more than twice as long as pseudopode, of one or two segments, second segment when present short and fleshy; maxillary palps three; labial palps two; ocelli four or absent.

Key to the known larvae.

1. Urogomphus of one segment; clypeo-labral margin with median tooth very short, clypeal teeth forming an angle of 30° .... *Q. molochinus.*
   Urogomphus biarticulate .... 2.
2. Clypeo-labral margin with median tooth nearly as long as lateral, clypeal teeth forming an angle of 40° to 45°. *Q. capucinus.*

Clypeo-labral margin with median tooth one-half length of first laterals, clypeal teeth forming an angle of 30°. *Q. spelaeus.*

QUEDIUS Stephens.

Quedius Stephens, 1832, Ill. British Ent. 5:214. acc Bernhauer & Schubert, 1916, Junk, Coleop. Cat. pars 67:417.

Egg. Known only in *Quedius molochinus* (Gravenhorst).

Larva. Cylindrical, head and thorax dark testaceous to brownish-rufous, abdomen dirty-gray to dirty-brown.

Head rectangular, sides parallel; not exhibiting a microscopic coriaceous appearance; frontal suture a smooth arc to very slightly flattened at point of union with epicranial suture, gula subtriangular to nipple shaped, reaching one-half distance to neck. *Clypeo-labral* margin with nine prominent teeth, median tooth short, first lateral long, conical, median clypeal

* Entomological Contribution No. 6, Department of Science, Southwest Missouri State Teachers College, Springfield, Missouri.

very distinct. *Ocelli* four except in *Quedius spelaeus* where they are absent. *Antennae* short, stubby, third segment widest near middle and from this point sloping anteriorly and posteriorly. *Maxillae* with palps of three segments, second segment longer than first, slightly curved, bearing one spine on inner surface and one on outer surface; third long, slender, conical. *Labium* with most of the slightly chitinized portion of the dorsal surface of the stipulae, the palpigers and the posterior portion of the ligula covered with small spines; palpigers prominent, not globular; ligula conical; palps of two segments, first long cylindrical, second long, slender conical. Spines below mouth opening may or may not be present, if present in the form of a single row or parts of a row. Spines above the mouth opening arranged in two rather large confused groups extending from a median position towards the corners of the mouth opening. Mouth opening angular.

Abdomen with urogomphus of one or two segments, clothed with a few bristle-like spines; terminal spine long bristle-like and a very short spine on inner angle of apex.

Pupa. Anterior margin of prothorax may or may not bear spines; lateral margins of the fourth, fifth, sixth, seventh, eighth and ninth abdominal segments each bearing spines; terminal segment bearing two spines in the male and four in the female pupa. (see figs. 9 & 10).

QUEDIUS MOLOCHINUS (Gravenhorst).

Staphylinus molochinus Gravenhorst, 1806, Monogr. Coleopterorum Micropterorum 46.

Quedius molochinus Erichson, 1840, Genera et Species Staphylinorum 535. Horn, 1878, Trans. Amer. Ent. Soc. 7:163. Xambeu, 1910, L'Echange 26:47.

(See figs. 4, 8, 12, 13, 19, 20 & 21).

Egg. Oval, yellowish white; surface faintly granular; length 1.2-1.5 mm., width 0.9-1.1 mm.; emergence opening a lengthwise slit.

Larva. Head and thorax dark brownish-rufous, abdomen dirty-gray never becoming yellow. Length mature larva 11.-13. mm., width 1.5-1.7 mm.

Head rectangular, one-half longer than wide, hind angles obtusely rounded; arc of frontal suture not deep but slightly flattened at point of union with epicranial suture; gula slightly nipple shaped; scar located opposite base of nipple. *Clypeolabral* margin with median tooth short, one-fourth length of first lateral; clypeal and labral teeth not forming a smooth arc as the first clypeal tooth is below the line formed by the third

clypeal and first laterals; clypeals forming an angle of 30°. *Ocelli;* second ocellus superior to line between first and third and slightly nearer third than first; second and fourth equidistant from third; fourth ventral and posterior to third; second, third and fourth subequal in diameter and slightly larger than first. *Antennae* with second segment two-fifths longer than first; third widest near middle, as long as second; thumb slender, two and one-half times as long as wide; fourth segment only slightly longer than first; two-thirds as wide as base of third. *Maxillae* with stripes as long as cardo; lacinia nearly as long as palpifer and first segment of palps, four times as long as wide; palps with second segment two-fifths longer than first, spine on inner surface four-fifths anterior, third segment slightly longer than second. *Labium* with band separating posterior half of dorsal surface of palpigers from stipulae narrow; spines on dorsal surface covering posterior two-thirds of the ligula as well as the slightly chitinized portion of the stripes and the dorsal surface of the palpigers; ligula less than one-half as long as first segment of palps; palps with second segment slender, nearly as long as first segment. Spines below mouth opening present, median portion of row depressed so as to appear as two short arcs, median and terminal spines in row shorter. Spines above the mouth opening in two groups extending from a median position to the corners of the mouth opening, spines sparse, confused, and irregular, not arranged as if combed. Mouth opening angular.

Abdomen with urogomphus of one segment; fleshy, not as long as pseudopode, constricted four-fifths posterior but constriction not enough to allow the posterior portion to be called a second segment.

Pupa. Length 7. mm., width 2.6 mm.; spines on anterior margin of prothorax lacking; spines on lateral margins of the fourth, fifth, sixth, seventh, eighth and ninth abdominal segments short, sharp; terminal spines short, sharp; female accessory sharp, slightly longer than terminal spines.

Adult determined by Howard Notman.

The mature and immature individuals both occur under old hay and vegetable debris. They occur with *Q. capucinus* but they are never as abundant. Pupation occurs both above and below the surface of the ground and the place of pupation is relatively deeper than *capucinus.*

One egg was collected at Bloomington, Indiana, 11.14.26 from under old hay. The egg hatched eight days later and in

a few days the larva fed readily on *Drosophila* larvae. Death occurred before the first molt, probably because of the daily variation in the temperature of the laboratory which is abnormally high at night when the building is closed.

In only four cases is the exact age of the pupa known. In these cases the length of the pupal period varied from eleven to fourteen days. All were collected in early spring at Bloomington, Indiana, and were reared inside where they may have been affected by the temperature of the building. No conclusion can be drawn from these figures as to the variation in length of the pupal period of this species.

The material available for study includes four larval exuviae, twenty-two pupal exuviae, and twenty-one reared adults. The immature forms were collected at Bloomington and Charlestown, Indiana and Springfield, Missouri.

QUEDIUS CAPUCINUS (Gravenhorst).

Staphylinus capucinus Gravenhorst, 1806, Monographia Coleopterorum Micropterorum 40.

Distichalius capucinus Casey, 1915, Memoirs on the Coleoptera 6:405.

Quedius capucinus Erichson, 1840, Genera et Species Coleopterorum 531. Horn, 1878, Trans. Amer. Ent. Soc. 7:160. Leng, 1920, Cat. Coleop. Amer. N. of Mexico 109.

(See figs. 1, 2, 3, 5, 6. 7, 9, 10, 11, 14, 15, 16, 17 & 18).

Egg. Unknown.

Larva. Head and thorax brownish-rufous; abdomen dirty-gray, never becoming yellow. Length of mature larva 9. - 11. mm., Width 0.8 - 1.0 mm.

Head rectangular, one-third longer than wide, hind angles prominent, well rounded; neck three-fifths as wide as head; frontal suture forming a deep arc, only slightly flattened at the point of union with the epicranial suture; gular suture subtriangular to very slightly nipple-shaped; posterior tip of scar located lateral to the posterior tip of gula. *Clypeo-labral* margin with median tooth two-thirds as long as first lateral; clypeal and labral teeth forming a rather smooth arc; clypeal teeth forming an angle of 40° - 45°. *Ocelli;* second ocellus very slightly superior to the line between the first and third; fourth almost directly ventral to third; all about equidistant and subequal in size; together they form almost a right angle. *Antennae* with second segment one-half longer than first; third

widest slightly anterior to middle, as wide as and one-half longer than second segment; thumb slightly longer than wide; fourth segment as long as first and as wide as base of third. *Maxillae* with stipes twice as long as cardo; lacinia as long as palpifer and first segment of palps, four times as long as wide; palpifer twice as wide as long; palps with second segment almost twice as long as first, spine on inner surface three-fourths posterior, spine on outer surface three-fourths anterior, third segment long, slender, longer than second. *Labium* with the band separating the posterior half of the dorsal surface of palpigers from the stipulae broad, triangular; ligula one-half as long as first segment of palps, posterior four-fifths of dorsal surface covered with small spines; palps with second segment slightly shorter than first. Spines below the mouth opening absent except at the angles of the mouth. Spines above the mouth opening arranged in two confused groups extending from a median position to the corners of the mouth opening and so arranged in small groups as to appear as if they had been combed transversely with a coarse comb. Mouth opening angular.

Abdomen with urogomphus biarticulate, fleshy; confluently three-fourths as long as pseudopode; second segment short but definitely formed, naked except for terminal spines, twice as long as wide, two-fifths as wide as and one-third as long as first segment.

Pupa. Length 5. - 6. mm., width 2. mm.; anterior margin of prothorax bears one pair of very short stiff spines; lateral margins of the fourth, fifth, sixth, seventh, eighth and ninth abdominal segments each bear a single short sharp spine; terminal spines long, sharp; female accessory spine long, sharp.

Adult determined by Howard Notman.

The larvae, pupae and adults are extremely common under old hay or vegetable debris which is decaying. They are to be found all winter (near Bloomington, Indiana) in such habitats in both the immature and adult stages. The length of the pupal period varies from ten to sixteen days. (For a detailed account see Voris, 1934, Table II.) The larvae form nest-like cavities either above or just below the surface of the ground. As in *P. tetragonocephalus* Notman. the amount of moisture seems to influence the place of pupation.

The material available for study includes 118 slides of larval exuviae and larvae, 143 slides of pupal exuviae and pupae, 138 reared adults and many preserved (alcoholic) specimens of larvae and pupae. All material was collected either at Bloomington, or Charleston, Indiana.

(To be continued.)

Notes on Pennsylvania Flea Beetles in Tobacco Fields (Coleoptera: Chrysomelidae).

By HAROLD C. HALLOCK, Pennsylvania State College.

(Continued from page 124.)

It is interesting to note that Jewett (1929) found that *Epitrix cucumeris* was largely replaced on potatoes in Kentucky by *Epitrix fuscula* as he reported 82 percent of the flea beetles were *Epitrix fuscula*. Although *Epitrix fuscula* was abundant on eggplant in Pennsylvania only a few specimens were found in the potato experimental fields. Lacroix (1935) reported *Epitrix parvula* as a rare insect in Connecticut. It is apparent, that *Epitrix cucumeris* is a northern insect and that *Epitrix parvula* is largely southern in its distribution, yet they are both injurious pests in Lancaster County, Pennsylvania.

Tomatoes. Conspicuous flea beetle feeding was observed upon tomato plants in seed beds and upon plants that had recently been transplanted to the field during May and June 1938. Collections made in late May showed an average of 88 percent *Epitrix cucumeris* and 12 percent *Epitrix parvula.* Very little flea beetle feeding on tomatoes was apparent during the remainder of the 1938 season in the 3 acre tomato field on the Esbenshade farm, although it joined the tobacco field which was heavily infested with *Epitrix parvula* from the middle of August until late October. The September and October figures, which are given in the table, represent collections from a large number of mature tomato plants while the May collections were from about a dozen small plants.

Corn. Five species of flea beetles, which are named in table I, were found moderately plentiful on corn from May until September. The corn was grown adjoining the tobacco fields at the Tobacco Experiment Station and on the Esbenshade farm. Although the flea beetles were observed to feed upon the leaves and the corn silk they never were sufficiently numerous to cause any crop injury. When the corn silk was young 10 to 15 flea beetles were often found burrowing in the silk of each ear. The young corn silk appeared especially attractive to *Epitrix parvula* and their abundance on corn increased at that time.

Ground cherry. Whenever ground cherry (*Physalis* sp.) was found in the vicinity of the three tobacco fields the leaves were always riddled by the flea beetle feeding. The injury to these weeds was caused by the feeding of *Epitrix cucumeris* and *Epitrix parvula*.

Jimson weed. Very little jimson weed (*Datura stramonium* L.) was allowed to grow in the vicinity of the three experimental tobacco fields. When jimson weed plants were found they always had the characteristic flea beetle feeding which was caused in this case by *Epitrix parvula*.

Morning glory. Although wild morning glory (*Convolvulus sepium* L.) generally shows considerable flea beetle foliage injury it can not be classed as a favored host plant of *Epitrix parvula*. During September 1937 wild morning glory, which was growing at the edge of Esbenshade's tobacco field, had a considerable number of *Epitrix parvula* feeding on its leaves. Collections were made again in May and October 1938 and the flea beetle population on wild morning glory was found at that time to be over 95 percent *Chaetocnema confinis*.

Indian mallow. After the old tobacco stumps had been entirely destroyed by plowing in the fall of 1938 a large number of *Epitrix parvula* were found on indian mallow (*Abutilon theophrasti* M.) which remained growing along the edge of the tobacco field at the Tobacco Experiment Station. The flea beetles were found feeding only on the under surface of the indian mallow leaves and they did not eat holes clear through the leaves as in the case of all other host plants observed.

When the tobacco and potato crop remains were destroyed by plowing in early September at the Tobacco Experiment Station the flea beetles congregated upon any small portion of the tobacco plants, which was not completely covered, and upon weeds along the border of the field. These small crop remnants were rapidly destroyed by the flea beetle feeding. The few remaining weeds, which were not destroyed, along the sides of the field were inhabited for a short time but the flea beetle population rapidly decreased in September and October at the

Tobacco Experiment Station. It is interesting to compare this condition with the tobacco field upon the Esbenshade farm that was disced in October instead of the earlier plowing. There was a large amount of tobacco plant remnants left in the field, which had been disced, and a heavy flea beetle population continued in this tobacco field during October.

SUMMARY.

There is considerable variation in the relative abundance of the different species of flea beetles found in the vicinity of tobacco at different periods of the growing season. The most abundant species during April, May and June was *Epitrix cucumeris*. This species caused severe injury to the foliage of tobacco plants that were growing in seed beds and that had been recently transplanted. During the same period heavy feeding by *Epitrix cucumeris* was also observed in potatoes and young tomato plants.

A heavy infestation of *Systena taeniata* var. *blanda* occurred on weeds in June 1937. When the tobacco was transplanted into the field *Systena taeniata* var. *blanda* migrated to the tobacco in large numbers and caused severe injury. This flea beetle was scarce in Lancaster County in 1938.

Although *Epitrix parvula* adults were present on plants in Lancaster County from April until November they did not become sufficiently abundant to cause plant injury until July 1937 and August 1938. This species was the predominating species in tobacco fields during July, August and September. *Epitrix parvula* was scarce on early potatoes but increased in abundance in August. It was often more abundant on potatoes in late August and early September than *Epitrix cucumeris*.

When the tobacco crop had been harvested *Epitrix parvula* continued to feed upon the tobacco suckers which sprouted from the tobacco stumps. The destruction of the tobacco suckers forced *Epitrix parvula* to feed on weeds and other plants along the sides of the tobacco field. When all tobacco crop remains and other favorite food plants of *Epitrix parvula* were destroyed in the early fall this flea beetle soon became scarce

in the vicinity of the tobacco field which had been properly cleaned. When tobacco crop remains were present in the field *Epitrix parvula* continued to feed abundantly until early November in 1938.

It is apparent that *Epitrix parvula* prefers to feed upon tobacco when that plant is present. This flea beetle was also observed to feed readily upon potato, ground cherry, jimson weed, indian mallow, corn, tomato and many other plants to a lesser degree during the fall months.

LITERATURE CITED.

DUCKETT, A. B. 1920. Annotated list of Halticini. Univ. of Md. Agri. Exp. Sta. Bull. 241, p. 111-155.

JEWETT, H. H. 1929. Potato flea-beetles. Ky. Agri. Exp. Sta. Bull. 297, p. 282-301. illus.

LACROIX, D. S. 1935. Insect pests of growing tobacco in Connecticut. Conn. Agri. Exp. Sta. Bull. 379, p. 87-130, illus,

MORGAN, A. C. and GILMORE, J. U. 1924. The tobacco flea-beetle in the dark fire-cured tobacco district of Kentucky and Tennessee. U. S. Dept. Agri. Farmer's Bull. 1425, p. 1-12, illus.

SCHOENE, W. J. and UNDERHILL, G. W. 1937. Suggestions for control of tobacco flea beetle. Va. Agri. Exp. Sta. Bull. 313, p. 11-14, illus.

A New Juniper Midge (Diptera: Cecidomyiidae).

By E. P. FELT, Bartlett Tree Research Laboratories, Stamford, Connecticut.

The insect described below caused serious injury last summer to Juniper twigs in the midwest. Specimens were received in 1938 from Prof. Leonard Haseman, Columbia, Missouri, Prof. George A. Dean, Manhattan, Kansas, Prof. Raymond Roberts, Lincoln, Nebraska, and Lee H. Townsend, Instructor in Zoology, Lexington, Kentucky. Evidently the insect was abundant over a considerable area.

Contarinia juniperina n. sp.

Male. Length 1.5 mm., antennae one-fourth longer than the body, thickly haired, dark brown, 14 segments, the fifth with

stems each with a length two and one-half times the diameter; the terminal segment having the basal stem with a length three times its diameter, the distal enlargement broad with a length about twice its diameter and broadly roundel apically. Palpi; the first segment short, quadrate, the second and third approximately equal and the fourth one-half longer than the third, greatly flattened and broadly rounded. Mesonotum, dark reddish brown, the scutellum reddish brown, the postscutellum fuscus yellowish, abdomen dark reddish brown, wings hyaline, halteres and legs mostly dark straw. The claws simple, the pulvilli as long as the claws. Genitalia; basal clasp segment moderately stout, terminal clasp segment rather short, stout, dorsal plate deeply and triangularly emarginate, the lobes broadly rounded apically; ventral plate deeply and roundly emarginate, the lobes moderately long and irregularly rounded apically; style rather short.

Female. Length 1.5 mm., antennae one-third the length of the body, dark straw, the fifth cylindrical with the enlargement one-half longer than the diameter, the stem one-fourth the length of the enlargement, the terminal segment broad, broadly rounded and with a length one-half greater than the diameter. Mesonotum dark reddish brown, scutellum dark yellowish, postscutellum dark reddish, abdomen reddish brown, ovipositor yellowish, about one-half the length of the body, the terminal lobes with a length six times the width, slender and tapering to an acute point, halteres pale straw, slightly fuscus apically, coxae and femora pale straw, tibiae and tarsi mostly dark straw, otherwise as in the male.

Described from dry specimens reared at Columbia, Missouri, April 1939. This species approaches in general characters the smaller and different *C. balsamifera* Felt. Type deposited in the U. S. National Museum.

New Name for a Genus of the Group Melanopli (Acrididae: Orthoptera).

Necaxacris new name.

This is a new name for the genus *Necaxa* Hebard, Trans. Amer. Ent. Soc., LVIII, p. 290, 1932, which is preoccupied by *Necaxa* Baker 1930 (*Mollusca*). The above name is proposed at this time in order to anticipate any author possibly proposing a name for the genus before my studies on the Mexican Melanopli have been published, since type labels, etc., and manuscript have been already completed for this group.

H. R. Roberts.

An Annotated List of the Ants of Maine (Hymenoptera: Formicidae).

By MERLE W. WING, 35 Bradbury Street, Old Town, Maine.

Concerning the extent of Maine's formicifauna, Dr. W. M. Wheeler[1] states: "I believe that there can be hardly more than 35 or 40 species, subspecies and varieties in the whole State." In this paper 54 forms are listed for Maine. Only those forms which have been specifically determined are included. Approximately 13 species, subspecies, and varieties not fully determined have been omitted. It would seem that ultimately more forms will be added to this list, in that the collecting to date has not been intensive throughout the State. Of the 54 forms listed, the following have been taken for the first time: *Formica vetula* Wheeler and *F. rubicunda* Emery.

The annotations while few and brief have been made only on forms collected by the writer. The works of W. M. Wheeler, C. W. Johnson, and William Procter have been used freely. Local names followed by Wheeler refer to the Casco Bay Region, while those followed by Johnson, Procter, or Brower refer to the Mt. Desert Region. From these works, further annotations on species listed herein can be obtained together with information on the climate and geography of Maine.

The writer acknowledges the valuable assistance rendered by the latè Dr. W. M. Wheeler in guidance during the early stages of this investigation; to Dr. M. R. Smith and Dr. Neal A. Weber thanks are due for their determinations, verifications, and valuable assistance of a general nature. In addition various unpublished records have been supplied by Dr. M. R. Smith and Mr. H. B. Peirson, State Entomologist.

Subfamily PONERINAE.

1. PONERA COARCTATA subsp. PENNSYLVANICA Buckley. Casco Bay Region (Wheeler); Bar Harbor, Tremont (A. E. Brower); Oakland (D. S. Fink); Orono (G. W. Simpson). Enfield (A. W. Berrie); Old Town, Orono (Wing).

Many small colonies under stones along edge of clearings near Old Town.

---

[1] The Ants of Casco Bay, Maine, with Observations on Two Races of *Formica sanguinea* Latreille. Bull. Amer. Mus. Nat. Hist. 24, Art. 33, 1908, p. 619.

Subfamily Myrmicinae.

2. Myrmica brevinodis Emery. Casco Bay Region (Wheeler); Hodgdon Brook, Station F181 (Procter); Enfield (A. W. Berrie); Presque Isle, Lamoine (Wing).

Forming medium-sized colonies under stones and bits of wood in open places.

3. M. brevinodis subsp. sulcinodoides Emery. "Maine" (Emery); Ogunquit (Pratt).

4. M. lobicornis subsp. fracticornis Emery. Lower Goose Island, Sebascodegan Island (Wheeler); S. W. Harbor, Green Mt., Long Pond (Johnson, Procter); Station F 173, Eden-Town Hill Road (Procter); Presque Isle, Old Town (Wing).

5. M. sabuleti subsp. americana Weber (M. S.) Mt. Desert (Hagen, McAtee); Old Town (Wing).

6. M. scabrinodis schencki var. emeryana Forel. "Maine" (Emery); S. W. Harbor, Witch Hole Pond (Johnson, Procter); Robinson Mt. (Procter); Orono (I. H. Blake); Ash Point, Old Town (Wing).

7. Stenamma brevicorne (Mayr). Dikes Peak (A. E. Brower); Ash Point, Presque Isle (Wing).

Forming small colonies under moss-covered bark of rotted stumps in coniferous growth near Presque Isle.

8. S. brevicorne diecki var. impressum Emery. Orono (I. H. Blake).

9. Aphaenogaster fulva aquia var. picea Emery. South Harpswell, Sebascodegan Island (Wheeler); Old Town (Wing).

One colony nesting in rotted stump in moist woods.

10. Crematogaster lineolata (Say). South Harpswell, Ragged Island (Wheeler); Robinson Mt., Cadillac Cliffs, Salisbury Cove (Johnson); Eden (Procter); Old Town (Wing).

11. C. lineolata var. cerasi (Fitch). "Maine" (Emery).

12. Leptothorax curvispinosus Mayr. South Harpswell (Wheeler); Paris (Frost).

13. L. curvispinosus subsp. ambiguus Emery. Mt. Desert (McAtee).

14. L. acervorum subsp. canadensis Prov. Stover's Point, near South Harpswell, Ragged Island (Wheeler); S. W. Harbor (Johnson, Procter); Paris (Frost); Orono (Severin, Wing); Ash Point, Old Town, Presque Isle (Wing).

15. L. emersoni Wheeler. Stover's Point, near South Harpswell (Wheeler); Lamoine (Wing).

Subfamily DOLICHODERINAE.

16. DOLICHODERUS TASCHENBERGI Mayr. Robinson Mt. (Procter).

17. D. TASCHENBERGI var. GAGATES Wheeler. South Harpswell, Sebascodegan Island (Wheeler).

18. D. PLAGIATUS Mayr. Section 26 (Procter); Ash Point, Old Town (Wing).

One colony nesting under stone in blueberry field at Ash Point.

19. D. PLAGIATUS var. INORNATUS Wheeler. S. W. Harbor (Johnson); Break Neck Pond (Procter).

20. D. PLAGIATUS subsp. PUSTULATUS Mayr. South Harpswell, Sebascodegan Island (Wheeler).

21. TAPINOMA SESSILE (Say). Prince's Point, Lower Goose Island (Wheeler); S. W. Harbor (Johnson Procter); Station F173 (Procter); Ash Point, Old Town, Orono, Presque Isle (Wing).

Subfamily FORMICINAE.

22. BRACHYMYRMEX HEERI subsp. DEPILIS Emery. South Harpwell, Lower Goose Island, Prince's Point (Wheeler); Orono (I. M. Burgess, Wing); Old Town (Wing).

23. CAMPONOTUS HERCULEANUS (L.). Harpswell Neck, Lower Goose Island, Prince's Point, Sebascodegan Island (Wheeler).

24. C. HERCULEANUS var. WYMPERI Forel. South Harpswell (Wheeler); Bar Harbor, Narrows (Johnson, Procter); Section 15 (Procter); Reeds Island, Penobscot Bay (A. C. Burrill); Heald Pond, near Jackman (F. A. Jones); Orono (J. F. Whitney); Ash Point, Lamoine, Presque Isle (Wing).

25. C. HERCULEANUS subsp. PENNSYLVANICUS (Degeer). Bar Harbor (Johnson); Mt. Desert Region (Procter); Mt. Katahdin (Hamlin, I. H. Blake); Bethel (Mus. Comp. Zoöl, I. H. Blake); Orono, Presque Isle (Wing).

26. C. HERCULEANUS LIGNIPERDA var. NOVAEBORACENSIS (Fitch). Harpswell Neck, Lower Goose Island, Prince's Point, Sebascodegan Island, Ragged Island, Haskell Island (Wheeler); Mt. Desert Region (Johnson, Procter); West Beach (Mus. Comp. Zoöl.); Lincolnville (Heald); Orono (C. O. Dirks, I. H. Blake, Wing); Ash Point, Old Town, Presque Isle (Wing).

27. C. HERCULEANUS LIGNIPERDA var. RUBENS Wheeler. Norway (S. J. Smith); Bethel (A. M. Edwards).

28. C. CARYAE (Fitch). Robinson Mt. (Procter); Orono (Wing).

A single stray worker taken.

29. LASIUS NIGER var. SITKAËNSIS Pergande. Long Pond, Bar Harbor (Johnson, Procter); Corfield (Procter); Penobscot Bay (A. C. Burrill); Presque Isle (Wing).

Nesting at base of rotted stump in moist woods.

30. L. NIGER var. NEONIGER Emery. South Harpswell, Ram Island, Haskell Island, Ragged Island, Lower Goose Island, Sebascodegan Island (Wheeler); Matinicus Island (U. S. Biol. Surv.); Norway (S. J. Smith); Bethel (Mus. Comp. Zoöl.); Ash Point, Lamoine, Old Town, Orono, Presque Isle (Wing).

31. L. NIGER var. AMERICANUS Emery. Casco Bay Region (Wheeler); Mt. Desert (McAtee); Stations F150 and F173 (Procter); Bridgeport (Miss Edmonds); Oakland (D. S. Fink); Enfield (A. W. Berrie); Ash Point, Old Town Presque Isle (Wing).

32. L. BREVICORNIS Emery. Northern portions of Casco Bay, Haskell Island (Wheeler).

33. L. UMBRATUS MIXTUS var. APHIDICOLA (Walsh). "Maine" (Emery); S. W. Harbor, Green Mt. (Johnson, Procter); Pretty Marsh, Bubble Pond (Procter); Elms (Deane); Orono (I. H. Blake).

34. L. UMBRATUS subsp. MINUTUS Emery. "Maine" (Emery).

35. L. UMBRATUS subsp. SUBUMBRATUS Viereck. Bar Harbor (Johnson); Mt. Desert (Procter); Penobscot Bay (A. C. Burrill); Ash Point (Wing).

Three winged queens were captured on August 5, 1938 as they were dropping down from their nuptial flight in the late afternoon.

36. L. (ACANTHOMYOPS) INTERJECTUS Mayr. Corfield (Procter).

37. L. (A.) CLAVIGER Roger. Deer Brook, Station F218 (Procter).

38. L. (A.) CLAVIGER var. SUBGLABER Emery. Sebascodegan Island (Wheeler).

39. FORMICA NEOGAGATES Emery. South Harpswell, Prince's Point, Lower Goose Island, Sebascodegan Island (Wheeler); S. W. Harbor, Bar Harbor (Johnson, Procter); Oakland (D. S. Fink); Ash Point, Old Town, Orono (Wing).

40. F. NEOGAGATES LASIOIDES var. VETULA Wheeler. Aroostook No. 1, Ash Point, Old Town, Presque Isle (Wing).

This form makes rather small colonies under stones in open dry fields.

41. F. PALLIDE-FULVA subsp. SCHAUFUSSI Mayr. Ogunquit (Pratt).

42. F. FUSCA L. South Harpswell, Lower Goose Island (Wheeler); Mt. Desert Region (Johnson, Procter); Monmouth (Frost); Presque Isle (Wing).

43. F. FUSCA var. SUBSERICEA Say. South Harpswell, Sebascodegan Island, Lower Goose Island, Prince's Point (Wheeler); New Mill Pond, Jordan Pond, Seal Cove, (Procter).

44. F. FUSCA var. ARGENTEA Wheeler. South Harpswell, Sebascodegan Island, Lower Goose Island (Wheeler).

45. F. FUSCA var. SUBAENESCENS Emery. Lower Goose Island (Wheeler); Tremont (Procter); Norway (S. J. Smith); Bethel (Mus. Comp. Zoöl.); Orono (I. H. Blake); Aroostook No. 1, Ash Point, Old Town (Wing).

46. F. FUSCA var. ALGIDA Wheeler. Kittery Point (R. Thaxter); Robinson Mt. (Procter).

47. F. FUSCA var. GLACIALIS Wheeler. South Harpswell, Casco Bay Region generally (Wheeler); Presque Isle (Wing).

48. F. TRUNCICOLA subsp. OBSCURIVENTRIS Mayr. Doughty's Point on Sebascodegan Island (Wheeler); Mt. Desert (Procter).

49. F. TRUNCICOLA subsp. INTEGRA Nylander. Lower Goose Island, Prince's Point (Wheeler); Salisbury Cove (Johnson); Eden, Corfield, Bar Harbor (Procter); Monmouth (Frost).

50. F. EXSECTOIDES Forel. South Harpswell, Prince's Point (Wheeler); Ogunquit (Pratt); Pittston, Jefferson, Augusta, Vassalboro, China (H. B. Peirson); Old Town (H. B. Peirson, Wing).

Numerous colonies of this species occur near Old Town. All colonies seen by the writer were rather small.

51. F. SANGUINEA subsp. ASERVA Forel. Harpswell Neck, Ash Point, Prince's Point, Lower Goose Island, Sebascodegan Island (Wheeler); Bar Harbor, S. W. Harbor, Green Mt. (Johnson, Procter); Section 26 (Procter); Oakland (D. S. Fink); Enfield (A. W. Berrie); Aroostook No. 1, Ash Point, Old Town, Presque Isle (Wing).

52. F. SANGUINEA subsp. RUBICUNDA Emery. Aroostook No. 1 (Wing).

One populous colony under stone near woods.

53. F. SANGUINEA subsp. SUBINTEGRA Emery. Harpswell Neck, Ash Point, Prince's Point, Lower Goose Island, Sebascodegan Island (Wheeler).

54. F. SANGUINEA subsp. SUBNUDA Emery. South Harpswell (Wheeler).

Aphids of the Genus Kakimia Infesting Ribes (Homoptera[1]).

By G. F. Knowlton and M. W. Allen.[2]

This report deals with seven species of the aphid genus *Kakimia* H. and F.[3] which attack currants and gooseberries, one species being here described as new. The following key serves to separate available material to species.

Key to Species

A. Cornicles at least 4 times hind tarsi in length.
  B. Sensoria present on antennal IV of alate *muesebecki* n. sp.
  BB. Sensoria absent on antennal IV of alate
    C. Rostral IV + V at least 0.17 mm. long........*ceri*
    CC. Rostral IV + V less than 0.17 mm. long, *ribe-utahensis*
AA. Cornicles less than 4 times hind tarsi in length.
  B. Unguis not exceeding 1.25 times antennal III.
    C. Sensoria rarely present on antennal IV of alate *ribifolii*
    CC. Sensoria on antennal IV usually exceeding 2 in number *houghtonensis*
  BB. Unguis usually exceeding 1.25 times antennal III.
    C. Aptera without sensoria on antennals IV and V. *cynosbati*
    CC. Aptera possessing sensoria on antennals IV and V. *thomasi*

Kakimia ceri G.-P.

Gillette and Palmer, Ann. Ent. Soc. Amer. 26: 354, 1933.

Collections: Specimens from Colorado, taken on native red currant at Rocky Mountain National Park and Nederland, August 23, 1935 (Knowlton); not yet taken in Utah.

Taxonomy: K. ceri differs from *K. muesebecki* in lacking sensoria on antennal IV of alates. It differs from *K. ribe-utahensis* in lateral hairs of cauda being slender and pointed at tip.

[1] Contribution from the Department of Entomology, Utah Agricultural Experiment Station, Logan.

[2] Research associate professor of entomology and graduate research assistant, respectively.

[3] The writers are indebted to M. A. Palmer, E. O. Essig, C. F. W. Muesebeck, H. B. Mills and L. G. Strom for the loan of berry aphid material.

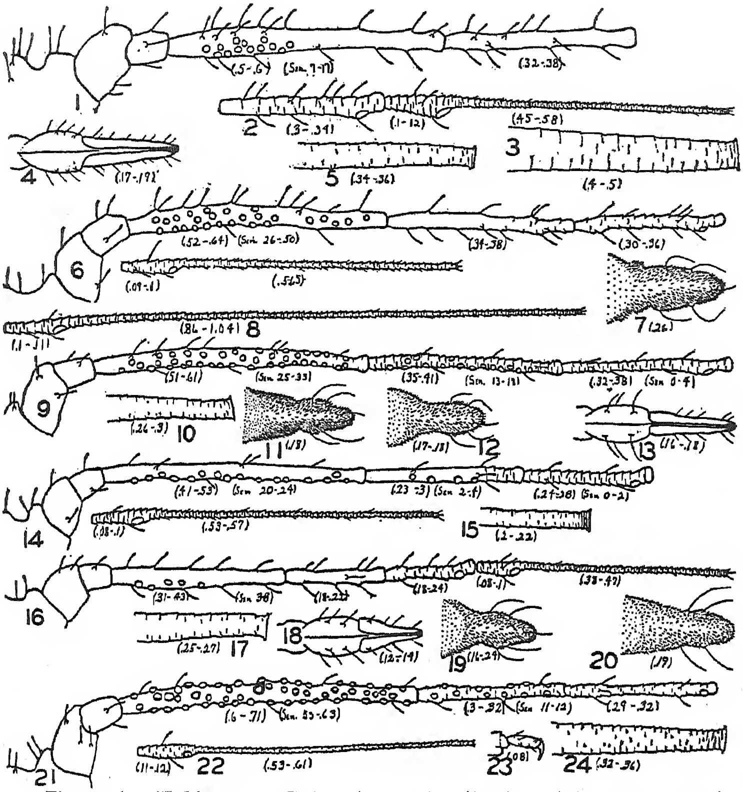


Figure A. *Kakimia ceri* G.-P. Aptera 1-4, 7: alate, 5-6. *K. cynosbati* (Oest.). Alate 8-11, 13. *K. houghtonensis* (Troop). Alate 12, 14-15; aptera 16-19. *K. muesebecki* n. sp. Alate 20-22, 24; aptera 23.

KAKIMIA CYNOSBATI (Oest.)

Oestlund, Geol. and Nat. Hist. Surv. Minn. Bul. 4:81, 1887.

Alate vivipara: Color green; body 1.84 to 1.94 mm. long; antennae 2.45 to 2.66, dusky entire length; hind tibiae 1.64 to 1.76; hind tarsi 0.1; cornicles 0.26 to 0.3, pale; cauda 0.18 mm., pale.

Collections: On wild gooseberry south of Woodruff, Utah, July 5, 1938 (Knowlton); on *Ribes,* Milwaukee, Wisconsin, June 8, 1933 (L. G. Strom); on ornamental gooseberry, Moline, Illinois, May 16, 1931 (Ross-Mohr); and on *Ribes,* Bozeman, Montana, August 30, 1912 (J. R. Parker).

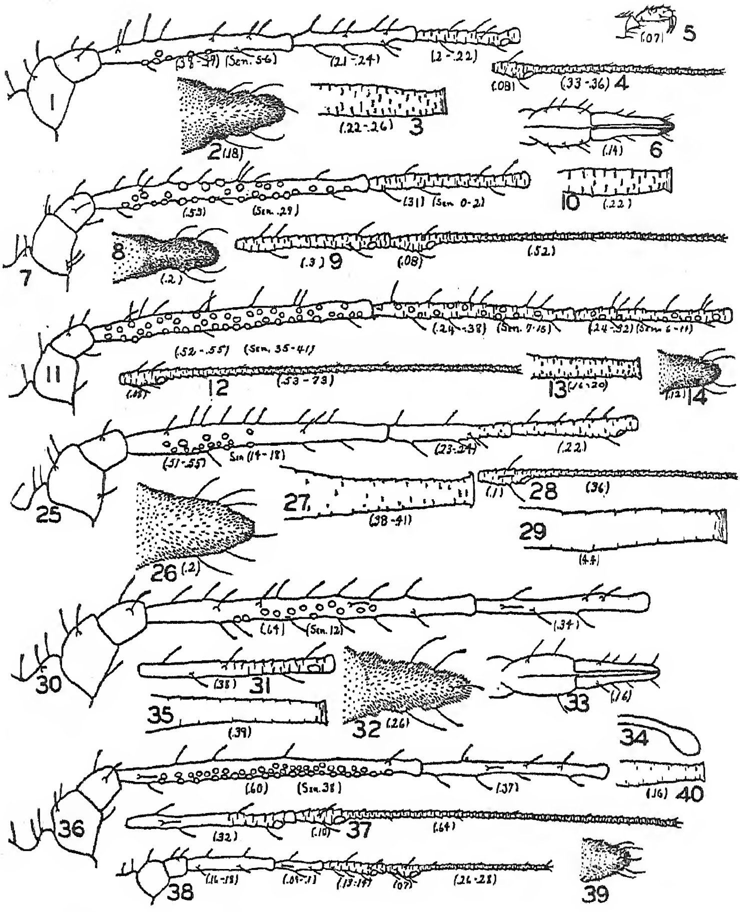


Figure B. *Kakimia ribifolii* (Davidson). Aptera 1-6; alate vivipara 7-10; alate male 11-14. *K. muesebecki* n. sp. Aptera 25-28. *K. ribe-utahensis* Knlt. Aptera 29-33, 34 enlarged apex of caudal hair; alate vivipara 35-37; ovipara 38-40.

Taxonomy: K. cynosbati differs from *K. thomasi* in having fewer secondary sensoria on antennals III, IV and V of alates and aptera.

KAKIMIA HOUGHTONENSIS (Troop).

Troop, Ent. News 17:59, 1906.

Alate vivipara: Body 1.33 to 1.49 mm. long; antennae, 1.76 to 1.88, dusky; rostral IV + V reaching second coxae; hind

tibiae 1.1 to 1.27, distal end dark; hind tarsi, 0.08 to 0.1; cornicles 0.2 to 0.22, pale; cauda 0.17 to 0.18, pale.

Apterous vivipara. Color yellow; body 1.43 to 176 mm. long; antennae 1.31 to 1.66, pale to slightly dusky; rostral IV + V exceeding second coxae; hind tibia 0.79 to 0.94; hind tarsi 0.08; cornicles 0.25 to 0.27, pale, lightly imbricated.

Apterous ovipara: Body 1.37 mm. long; antennae 0.79 to 0.32, pale; antennal III, 0.16; IV, 0.1; V, 0.1; VI, 0.06 + 0.25; rostral IV + V, 0.1; hind tibiae 0.53; hind tarsi 0.08; cornicles 0.14 to 0.16, pale; cauda, 0.1 to 0.11, pale.

Collections: Aptera extremely abundant on *Ribes grossularia* in Utah at Logan, June 21, 1926 (Knowlton); alates, Dayton, Ohio, May 20, 1925 and males and ovipara, Columbus, Ohio, October 21, 1924 (Knowlton); Milwaukee, Wisconsin, July 2, 1935 (L. G. Strom); Joliet, Montana, July 14, 1915.

Taxonomy: *K. houghtonensis* differs from *K. ribifolii* in having more sensoria on antennal IV.

Kakimia muesebecki n. sp.[4]

Alate vivipara: Body 1.74 mm. long; antennae 2.05 mm., dusky; antennal III, 0.6 to 0.64 mm. long with 55 to 63 tuberculate sensoria; IV, 0.3 to 0.32 with 11 to 12 sensoria; V, 0.29 to 0.32; VI, 0.11 to 0.12 + 0.53 to 0.61; rostral IV + V, 0.16 to 0.17; hind tibiae 1.37; hind tarsi 0.08; cornicles 0.32 to 0.36, dusky; cauda 0.19, dusky.

Apterous vivipara: Body, 1.84 mm. long; antennae 1.64, pale entire length; antennal III, 0.51 to 0.53 with 14 to 18 sensoria; IV, 0.23 to 0.24; V, 0.22; VI, 0.1 + 0.36; rostral IV + V, 0.17; hind tibiae 1.16; hind tarsi 0.07 to 0.08; cornicles 0.38 to 0.41, pale; cauda, 0.2 mm. long.

Collections: Alate and apterous vivipara collected on *Ribes* at Redwood Canyon, CALIFORNIA, April 12, 1916 (W. M. Davidson).

Taxonomy: This species runs to *K. ceri* G.-P. in Gillette and Palmer's key (Annals Ent. Soc. of Amer. 27:160, 1934) from which it differs in having sensoria on antennal IV of alate vivipara and shorter antennals IV and V. This species was apparently collected from near the type locality of *K. ribifolii* (Dvds.) from which species it differs in the alate form having more sensoria on antennals III and IV, longer cornicles and base of antennal VI.

[4] The writers name this species in honor of C. F. W. Muesebeck of the U. S. Bureau of Entomology and Plant Quarantine. Types are returned to the U. S. National Museum.

KAKIMIA RIBE-UTAHENSIS Knlt.

Knowlton, Ann. Ent. Soc. Amer. 28: 281, 1935.

Alate vivipara: Antennae 2.3 mm. long; rostrum reaching 3rd coxae; hind tibiae 1.47 mm.; cornicles 0.39, slightly dusky; cauda pale.

Apterous vivipara: Body 2.29 mm. long; hind tibiae 1.47; hind tarsi 0.09; cornicles 0.44; cauda 0.26, pale.

Apterous ovipara: Body 1.5 mm. long; antennae 0.9; hind tibiae swollen, 0.53; hind tarsi 0.09; cornicles 0.16 mm., pale; cauda pale.

Taxonomy: Kakimia ribe-utahensis runs to *K. ceri* in Gillette and Palmer's key (Ann. Ent. Soc. Amer. 27:160) from which it differs in having shorter rostral IV + V, more definitely knobbed lateral hairs on cauda, a different seasonal life history, and smaller apterous ovipara.

Collections: Summer vivipara, males and ovipara of *K. ribe-utahensis* were taken at Cedar City, Utah, July 18, 1925, on native black currant (Knowlton).

KAKIMIA RIBIFOLII (Dvds.).

Davidson, Jr. Econ. Ent. 10:294, 1917.

Alate vivipara: Body 1.37 mm. long; antennae 1.98, dusky; cornicles dark, imbrications minutely setulose; cauda dark, 0.2 mm. long.

Apterous vivipara: Body 1.39 to 2.05 mm. long; antennae 1.39 to 1.45, dusky; hind tibiae 0.98 to 1.02; hind tarsi 0.07; rostral IV + V, 0.14 mm.; cornicles and cauda dark.

Alate male: Body 1.55 mm. long; antennae 1.84, dark; antennal III, 0.53 mm. long with 35 sensoria; IV, 0.24 with 7 sensoria; VI. 0.08 + 0.55; cauda 0.1, dark; other characters as in alate vivipara.

Collections: Two slides lent by Professor E. O. Essig were collected on *Ribes* at Berkeley, California, March 18, 1937(W. Sampson); 3 slides from the type locality were secured through C. F. W. Muesebeck from the U. S. National Museum, curling leaves of *Ribes glutinosum* at Redwood Canyon near Walnut Creek, California, May 7, 1914 and March 26, 1915; also a metatype slide, Redwood Canyon May 7, 1914 (W. M. Davidson), was lent by Professor M. A. Palmer.

Taxonomy: K. ribifolii (Dvds.) is close to *K. houghtonensis* (Troop) but differs in having fewer sensoria on antennal IV of alate and shorter unguis in aptera.

KAKIMA THOMASI H.-F.

Hottes and Frison, Ill. Nat. Hist. Surv. Bul. 19: 343, 1931.

Described from specimens collected on *Ribes* at Rock Island, Illinois, July 9, 1929 (Frisom-Hottes).

List of Titles of Publications Referred to by Numbers in Entomological Literature in Entomological News.

1. Transactions of The American Entomological Society. Philadelphia.
2. Entomologische Blätter, red. v. H. Eckstein etc. Berlin.
3. Annales Sci. Naturelles, Zoologie, Paris.
4. Canadian Entomologist. London, Canada.
5. Psyche, A Journal of Entomology. Boston, Mass.
6. Journal of the New York Entomological Society. New York.
7. Annals of the Entomological Society of America. Columbus, Ohio.
8. Entomologists' Monthly Magazine. London.
9. The Entomologist. London.
10. Proceedings of the Ent. Soc. of Washington. Washington, D. C.
11. Deutsche entomologische Zeitschrift. Berlin.
12. Journal of Economic Entomology, Geneva, N. Y.
13. Journal of Entomology and Zoology. Claremont, Cal.
14. Archivos do Instituto Biologico, Sao Paulo.
15. Annales Academia Brasileira de Sciencias. Rio de Janeiro.
17. Entomologische Rundschau. Stuttgart, Germany.
18. Entomologische Zeitschrift. Frankfurt-M.
19. Bulletin of the Brooklyn Entomological Society. Brooklyn, N. Y.
20. Societas entomologica. Stuttgart, Germany.
21. The Entomologists' Record and Journal of Variation. London.
22. Bulletin of Entomological Research. London.
23. Bollettino del Lab. di Zool. gen. e agraria della Portici. Italy.
24. Annales de la société entomologique de France. Paris.
25. Bulletin de la société entomologique de France. Paris.
27. Bolletino della Societa Entomologica Italiana. Genova.
28. Ent. Tidskrift utgifen af Ent. Föreningen i Stockholm. Sweden.
29. Annual Report of the Ent. Society of Ontario. Toronto, Canada.
30. Archivos do Instituto de Biologia Vegetal, R. d. Janeiro.
31. Nature. London.
32. Boletim do Museu Nacional do Rio de Janiero. Brazil.
33. Bull. et Annales de la Société entomologique de Belgique. Bruxelles.
34. Zoologischer Anzeiger, hrsg. v. E. Korschelt. Leipzig.
35. The Annals of Applied Biology. Cambridge, England.
36. Trans. Royal Entomological Society, London. England.
37. Proceedings of the Hawaiian Entomological Society. Honolulu.
38. Bull. of the Southern California Academy of Sciences. Los Angeles.
39. The Florida Entomologist. Gainesville, Fla.
40. American Museum Novitates. New York.
41. Mitteilungen der schweiz. ent. Gesellschaft. Schaffhausen, Switzerland.
42. The Journal of Experimental Zoology. Philadelphia.
43. Ohio Journal of Sciences. Columbus, Ohio.
44. Revista chileña de historia natural. Valparaiso, Chile.
45. Zeitschrift für wissenschaftliche Insektenbiologie. Berlin.
46. Zeitschrift für Morphologie und Ökologie der Tiere. Berlin.
47. Journal of Agricultural Research. Washington, D. C.
49. Entomologische Mitteilungen. Berlin.
50. Proceedings of the U. S. National Museum. Washington, D. C.
51. Notulae entomologicae, ed. Soc. ent. Helsingfors. Helsingfors, Finland.
52. Archiv für Naturgeschichte, hrsg. v. E. Strand. Berlin.
53. Quarterly Journal of Microscopical Science. London.
54. Annales de Parasitologie Humaine et Compareé. Paris.
55. Pan-Pacific Entomologist. San Francisco, Cal.

56. "Konowia". Zeit. für systematische Insektenkunde. Wien, Austria.
57. La Feuille des Naturalistes. Paris.
58. Entomologische Berichten. Nederlandsche ent. Ver. Amsterdam.
59. Encyclopédie entomologique, ed. P. Lechevalier. Paris.
60. Stettiner entomologische Zeitung. Stettin, Germany.
61. Proceedings of the California Academy of Sciences. San Francisco.
62. Bulletin of the American Museum of Natural History. New York.
63. Deutsche entomologische Zeitschrift "Iris". Dresden.
64. Zeitschrift des österr. entomologen-Vereines. Wien.
65. Zeitschrift für angewandte Entomologie, hrsg. K. Escherich. Berlin.
66. Report of the Proceedings of the Entomological Meeting. Pusa, India.
67. University of California Publications, Entomology. Berkeley, Cal.
68. Science. New York.
69. Physis. Revista Soc. Argentina Cien. Nat. Buenos Aires.
70. Entomologica Americana, Brooklyn Entomological Society. Brooklyn.
71. Novitates Zoologicae. Tring, England.
72. Revue russe d'Entomologie. Leningrad, USSR.
73. Mem. Instituto Butantan. Sao Paulo, Brazil.
74. Sbornik entomolog. národniho musea v Praze. Prague, Czechoslovakia.
75. Annals and Magazine of Natural History. London.
77. Comptes rendus heb. des séances et mémo. de la soc. de biologie. Paris.
78. Bulletin Biologique de la France et de la Belgique. Paris.
79. Koleopterologische Rundschau. Wien.
80. Lepidopterologische Rundschau, hrsg. Adolf Hoffmann. Wien.
82. Bulletin, Division of the Natural History Survey. Urbana, Illinois.
83. Arkiv för zoologie, K. Svenska Vetenskapsakademien i. Stockholm.
84. Ecology. Brooklyn.
85. Genetics. Princeton, New Jersey.
87. Archiv für Entwicklungs mechanik der Organ., hrsg. v. Roux. Leipzig.
88. Die Naturwissenschaften, hrsg. A. Berliner. Berlin.
89. Zoologische Jahrbücher, hrsg. v. Spengel. Jena, Germany.
90. The American Naturalist. Garrison-on-Hudson, New York.
91. Journal of the Washington Academy of Sciences. Washington, D. C.
92. Biological Bulletin. Wood's Hole, Massachusetts.
93. Proceedings of the Zoological Society of London. England.
94. Zeitschrift für wissenschaftliche Zoologie. Leipzig.
95. Proceedings of the Biological Soc. of Washington, Washington, D. C.
97. Biologisches Zentralblatt. Leipzig.
98. Le Naturaliste Canadien. Cap Rouge, Chicoutimi, Quebec.
99. Mélanges exotico-entomologiques, Par Maurice Pic. Moulins, France.
100. Bulletin Intern., Acad. Polonaise Sci. et Lett. Cracovie.
101. Tijdschrift voor entomologie. Nederland. Ent. Ver., Amsterdam.
102. Entomologiske Meddelelser, Entomologisk Forening, Copenhagen.
103. Journal of the Kansas Entomological Society, Lawrence, Kansas.
104. Revista de la Sociedad entomologica Argentina, Buenos Aires.
105. Revista Entomologia, Sao Paulo, Brazil.
106. Anales Sociedad Cientifica Argentina, Buenos Aires.
107. Proc., Royal Entomological Society, London.
108. Revista, Col. Nac. Vicente Rocafuerte, Guayaquil.
109. Arbeiten uber morpholog. und taxonom. ent. aus Berlin-Dahlem.
110. Arbeiten ueber physiolog. u. angewandte ent. aus Berlin-Dahlem.
111. Memorias do Instituto Oswaldo Cruz. Rio de Janeiro.
112. Anales del Instituto de Biologia Mexico.
113. Entomologische Beihefte aus Berlin Dahlem.
114. Occasional Papers of the Museum of Zoology, University of Michigan.
115. Memorias de la Soc. Cubana de Hist. Nat. Havana, Cuba.
116. Parasitology. Ed. Keilin and Hindle. London.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( ) follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—**Abrams, L.**—Entomological collections. [14th Ann. Rep. Nat. Hist. Mus. Stanford Univ.] 1937-38: 3-4. **Bartlett, K. A.**—A search in the Guianas and Trinidad for predatory beetles of the bamboo scales. [Jour. Agric. Univ. P. R.] 22: 493-495. **Beaulne, J. I.**—Liste des parasites et predateurs recoltes au Laboratoire d'Entomologie a Quebec. [98] 66: 95-96. **Bovien, P.**—Some types of association between Nematodes and Insects. [Vidensk. Medd. fra Dansk naturh. Foren.] 101: 1-114, ill. **Brues, C. T.**—The mimetic resemblance of flies of the genus Systropus to wasps. [5] 46: 20-22. **C. H. D. C.**—A new "Nomenclator Zoologicus." [Can. Field-Nat.] 53: 62. **Davis, J. J.**—The necessity of a changing world. [12] 32: 1-10. **Goidanich, A.**—Il deperimento primaverile del Sorgo zuccherino in Piemonte nei suoi rapporti congli insetti e in particolare con gli Afidi. [Boll. Inst. Ent. Bologna] 10: 281-315, ill. **Henze, Dr.**—Köninginnen in einem Hornissenschwarm. [Kosmos] 36: 116-117, ill. **Holloway, J. K.**—An agar preparation for feeding adult parasite insects. [12] 32: 154. **Johnson & Mellanby.**—Bedbugs and cockroaches. [107] A, 14:50. **Jones, M. P.**—4-H Club Insect Manual. [U. S. D. A.] Misc. Publ. 318: 63 pp., ill. **Liu, Gaines.**—Some extracts from the history of entomology in China. [5] 46: 23-28. **Parks et al.**—Agencies utilized in dessemin-ating information on insect control. [12] 32: 11-21. **Philip, C. B.**—Ticks as vectors of animal diseases. [4] 71: 55-65.

Poulton, E.—Wings of butterflies, day and night-flying moths and other insects collected by the late F. W. Urich in the haunts of a Trinidad bat, Micronycterus megalotis. [107] A, 14: 38-40. "Survival value of Acridian protective coloration." [107] A, 14: 31-32. **Rawson, D. S.**—A biological survey of Okanagan Lake, British Columbia. Bottom Fauna. [Fish. Res. Bd. Canada] Bull. 56: 17-18. **Schmidt, W. J.**—Arthropoden in Polarisationsoptischer nachweis des chitins. [Zeit. wiss. Mikroskopie] 56: 40-44. **Taylor, T. H. C.**—The usefulness of entomological collections in agricultural institutions. [E. African Agric. Jour.] 4: 356-360. **Teale, E. W.**—Grassroots Jungles; a book of insects. Dodd Mead & Co., N. Y., 231 pp., ill. **Thomas, C. A.**—The animals associated with edible fungi. [6] 47: 11-37. **Townsend, C. H. T.**—Speed of Cephenemyia. [6] 47: 43-46.

ANATOMY, PHYSIOLOGY, ETC.—**Argo, V. N.**—The effect of temperature upon the oxygen requirements of certain adult insects and insect eggs. [7] 32: 147-163. **Asana, J. J.**—A chromosomal survey of some Indian insects. I. Morphology of the chromosomes in eight species of the Locustidae. [Jour. Fac. Sci. Hokkaido Imp. Univ.] 6: 211-234, ill. **Becker, W. B.**—Larval development of the native elm bark beetle, Hylurgopinus rufipes in Massachusetts. [12] 32: 112-121. **Bernard, F.**—Recherches sur la morphogénèse des yeux composés d'Arthropodes. Développement. Croissance, Réduction. [Suppl. Bull. Biol. France et Beligique] 23: 162 pp., ill. **Bess, H. A.**—Investigations on the resistance of mealybugs (Homoptera) to parasitization by internal Hymenopterous parasites, with special reference to phagocytosis. [7] 32: 189-226, ill. **Braun, W.**—Contributions to the study of development of the wing-pattern in Lepidoptera. [Biol. Bull.] 76: 226-240, ill. **Buscalioni & Grandi.**—See under Hymenoptera. **Chadwick, L. E.**—A simple stroboscopic method for the study of insect flight. [5] 46: 1-8. **Chiu, Shin Foon & McCay.** Nutritional studies on the confused flour beetle (Tribolium confusum) and the bean weevil (Acanthoscelides obtectus). [7] 32: 164-170. **Clausen, C. P.**—The effect of host size upon the sex ratio of Hymenopterous parasites and its relation to methods of rearing and colonization. [6] 47: 1-9. **DeBach & McOmie.**—New diseases of termites caused by bacteria. [7] 32: 137-146. **Dethier, V. G.**—Further notes on cannabilism among larvae. [5] 46: 29-35. **Drilhon & Busnel.**—Sur la présence et la teneur flavine des tubes de Malpighi

des insectes. [Comp. Rend Sea. L'Acad Sci., Paris] 208: 839-841. **Evans, A. C.**—The utilization of food by the larvae of the Buff-tip, Phalera bucephala (Lep.) [107] A, 14: 25-30. **Flanders, S. B.**—Environmental control of sex in Hymenopterous insects. [7] 32: 11-26, ill. **Forbes, W. T. M.**—The muscles of the Lepidopterous male genitalia. [7] 32: 1-10, ill. **Gunderson & Strand.**—Toxicity of Hydrogen cyanide, chlorpicrin and ethylene oxide to eggs, nymphs and adults of the bedbug. [12] 32: 106-110, ill. **Hilton, W. A.**—Nervous system and sense organs. LXXVII: Odonata. [13] 31: 9-16, ill. **Hodson, A. C.**—Biological notes on the egg parasites of Malacosoma disstria. [7] 32: 131-136. **Imms, A. D.**—On the antennal musculature in insects and other arthropods. [Quart. Jour. Micro. Sci., London] 81: 273-320, ill. **Khouvine & Gregoire.**—Repartition du phosphore dans les larves, les pupes et les imagos de Calliphora erythrocephala. [Comptes Rendus Sea. Soc. Biol. Paris] 130: 1050-1051. **Lecamp, M.**—Sur la régénération des pièces buccales chez les Phasmes. [Comptes Rendus Hebdom Sea. Acad. Sci. Paris] 208: 1052-1054. **Lindsey, A. W.**—Variations of insect genitalia. [7] 32: 173-176, ill. **List, G. M.**—The effect of temperature upon egg deposition, egg hatch and nymphal development of Paratrioza cockerelli (Homopt.: Psyllid.) [12] 32: 30-36. **Maki, T.**—Studies on the thoracic musculature of insects. [Mem. Fac. Sci. Agric. Taihoku Imp. Univ.] 24: 343 pp., ill. **McNay, C. G.**—Studies on repellents for biting flies. [4] 71: 38-44. **Pradhan, S.**—Neuro-muscular study of the mouth-parts of Coccinella septempunctata, with a comparison of the mouth-parts in carnivorous and herbivorous coccinellids. [Rec. of the Indian Mus.] 40: 341-358, ill. **Rawat, B. L.**—On the habits, metamorphosis and reproductive organs of Naucoris cimicoides (Hemipt.). [36] 88: 119-138, ill. **Roeder, K. D.**—The action of certain drugs on the insect central nervous system. [Biol. Bull. 76: 183-189. **Skufyin, K.**—Changes in the wing veins of Drosophila melanogaster due to developmental depression. [Nauch. Raboty Molodyk Uchenyk Trudy] 1938: 227-236, ill. (Russian with English summary). **Walton & Fenton.**—Notes on Empusa grylli in Oklahoma. [12] 32: 155-156. **Wieting & Hoskins.**—The olfactory responses of flies in a new type of insect olfactometer. II.—Responses of the housefly to ammonia, carbon dioxide and ethyl alcohol. [12] 32: 24-29, ill. **Woodruff, L. C.**—An analysis of insect growth curves.

[6] 47: 47-55, ill. **Yeager, J. F.**—Apparent nuclear-cytoplasmic transfer in some insect blood cells. [7] 32: 49-57, ill. Significance of the presystolic notch in the mechanocardiogram of Periplaneta americana. [7] 32: 44-48, ill.

ARACHNIDA AND MYRIOPODA.—Brues, C. T.—Additional records of Onychophora from the island of Haiti. [5] 46: 36-37, ill. **Lowrie, D. C.**—Geolycosa, The Wolf of the Dunes. [The Chicago Nat.] 2: 1-8, ill. **Michelbacher, A. E.**—Seasonal variation in the distribution of two species of Symphyla found in California. [12] 32: 53-57, ill. **Moreno, A.**—Contribucion al estudio de los escorpionidos Cubanos. Superfam. Buthoidea. [Mem. Soc. Cubana Hist. Nat.] 13: 63-75, ill. (k*).

THE SMALLER ORDERS OF INSECTS.—Arle, R.—Collemboles nouveaux de Rio de Janeiro. [Ann. Acad. Brasileira Sci.] 11: 25-32, ill. (*). **Bailey, S. F.**—The six-spotted thrips, Scolothrips sexmaculatus.][12] 32: 43-46, ill. **Blanton, F. S.**—Notes on some thrips collected in the vicinity of Babylon, Long Island, N. Y. [6] 47: 83-94. **Coleman, C.**—Preliminary report on the Poduridae of southern California. [13] 31: 3. **Cory, E. N.**—The termite, an object lesson. [4] 71: 36-38. **Crawford, J. C.**—Thysanoptera from northern New Jersey, with descriptions of n. spp. [6] 47: 69-81. **Henriksen, K. L.**—Siphonaptera. [Zool. Iceland] 3:7. **Kennedy, C. H.**—Protallagma runtuni n. sp. of dragonfly from Ecuador with notes on the genus. (Odonata: Coenagriidae). [7] 32: 177-187, ill. Archaepodagrion bicorne, a very primitive dragonfly from eastern Ecuador (Odonata: Megapodagrioninae). [7] 32: 32-43, ill. **McDunnough, J.**—New British Columbian Ephemeroptera. [4] 71: 49-54, ill. **Milne, M. J.**—Immature North American Trichoptera. [5] 46: 9-19, (k). **Ross, H. H.**—N. spp, of Trichoptera from the Appalachian region. [10] 41: 65-72, ill. **Thompson, G. B.**—Mallophaga. [Res. Voyage de la Belgica en 1897-99] 1938: 6 pp., ill. (s). **Wolcott, G. N.**—Comejen y Polilla. [Est. Exp. Agric. Univ. Puerto Rico] Bol. 48: 26 pp., ill.

ORTHOPTERA.—Eichler, W.—Lebensraum und Lebensgeschichte der Dahlemer Palmenhausheuschrecke Phlugiola dahlemica (Tettigoniid.). [11] 1938: 497-570, ill. **Gunther, K.**—Neue und wenig bekannte Phasmoiden aus dem Indian Museum, Calcutta. [Rec. of the Indian Mus.] 40: 123-141, ill. (s*). **LeFeuvre, W. P.**—A Phasmid with

spermatophore. [107] A, 14:24. **Miller, N. C. E.**—Oviposition by Heteropteryx dilatatus (Phasm.). [107] A, 14:48. **Poulton, E.**—See under General. **Tillyard, R. J.**—Kansas Permian insects. Part 21. The cockroaches, or order Blattaria. [Amer. Jour. Sci.] 34: 249-276, ill. (k). **Uvarov, B. P.**—Notes on a desert grasshopper with digging habits, Eremogryllus hammadae (Acrid.). [107] A, 14: 19-23, ill. **Walton & Fenton.**—See under Anatomy.

HEMIPTERA.—Allen & Knowlton.—Aphis species infesting Ribes. [7] 32: 125-130, ill. (k*). **Anon.**—Osservazioni Tassonomiche, corologiche ed ecologiche sugli Afidi. [Boll. Inst. Ent. Bologna] 10: 316-346, ill. **Balduf, W. V.**—Food habits of Phymata pennsylvanica americana. [4] 71: 66-74. **Cassidy & Barber.**—Hemipterous insects of cotton in Arizona: their economic importance and control. [12] 32: 99-104, ill. **Davidson & DeLong.**—Studies of the gen. Empoasca (Cicadell.), Pt. 6.—Twenty-two n. spp. of Empoasca from North America. [43] 39: 110-118. **Drake & Harris.**—Veliidae y Gerridae Sudamericans. [Notas del Museo, Buenos Aires] 3: 199-204, ill. (s*). **Palmer, M. A.**—Observations on vagabond gall aphids in cottonwood. [Jour. Colo.—Wyom. Acad. Sci.] 2:37. **Plank, H. K.**—Oeregrinator biannulipes [Reduviidae] a predator of the Bamboo Powder-Post Beetle in Porto Rico [Bostrychidae] [12] 32: 151. **Rawat, B. L.**—See under Anatomy. **Romney, V. E.**—Breeding areas of the tomato psyllid, Paratrioza cockerelli. [12] 32:150. **Uvarov, B. P.**—An American Membracid in Jugoslavia. [107] A, 14:48.

LEPIDOPTERA.—Bird, H.—A Papaipema from Arizona. [4] 71: 74-76, ill. (*). **Braun, W.**—See under Anatomy. **Clarke, J. F. G.**—A new Geometrid genus from North America, with a discussion of its type. [10] 41: 73-75, ill. **Comstock & Dammers.**—Studies in the metamorphoses of six California moths. [Bull. So. Calif. Acad. Sci.] 37: 105-128, ill. **Corfe, C. E.**—Celerio lineata in Ontario. [Can. Field Nat.] 53:58. **Freeman, T. N.**—Notes on Sympistis kolthoffi and S. zetterstedti laboradoris from Churchill, Manitoba. [4] 71: 77-78. **Gerasimov, A. M.**—Die Chaetotaxie des analsegments der Raupen. [64] 24: 36-39, ill., cont. **Heinrich, C.**—The cactus-feeding Phycitinae; a contribution toward a revision of the American Pyralidoid moths of the family Phycitidae. [50] 86: 331-413, ill., (k*). **Hemming, F.**—On five genera in the Lepidoptera Rhopalo-

cera at present without valid names. [107] B, 8:39, (*). **Klima, A.**—Lepidopterorum Catalogus. Pars. 89. Pyralididae: Subfam. Pyraustinae I. 224 pp. **Lindsey, A. W.**—A n. spp. of Hesperia. [7] 32: 171-172. **Meiners, E. P.**—The life history of Euchloe olympia, with some notes on its habits. [Proc. Missouri Acad. Sci.] 4: 154-156. **Naumann, F.**—Tabellarisches Verzeichnis der europaischen Lepidopteren mit reduziertem oder schwach ausgebildtem Russel und deren Flugzeit. [63] 1938: 112-121. **Schaus, W.**—New neotropical lepidoptera of the family Notodontidae [Ann. Carnegie Mus.] 27: 321-348, ill. (*). **Shepard, H. H.**—Lepidopterorum Catalogus. Pars 90. Hesperiidae: Subfam. Hesperiinae II. 127-206. **Stichel, H.**—Lepidopterorum Catalogus. Pars 91. Nymphalidae II. Subfam. Charaxidinae I. 375-542. **Swain, R. B.**—Notes on the biology of the Great Basin Tent Caterpillar, Malacosoma fragilis, (Lasiocamp.). [4] 71: 76-77. **Wheeler, L. R.**—Deaths among butterflies. [Pro. Linn. Soc. London] 1938-9: 79-88.

DIPTERA.—Adams, C. F.—A preliminary list of flower-flies (Syrphid.) from Missouri. [Proc. Missouri Acad. Sci.] 4: 153-154. **Alexander, C. P.**—Studies on the craneflies of Mexico, Pt. VI. [7] 32: 70-90, (*). **Bartlett, K. A.**—See under Coleoptera. **Felt, E. P.**—A new gall midge on Rhododendron. [6] 47: 41-42. **Hardy & Knowlton.**—New and little known western Pipunculidae. [7] 32: 113-124, ill. **Harmston & Knowlton.**—A new Dolichopus from Iowa. [10] 41: 87-88, ill. **James, M. T.**—The robber flies of Colorado. [Jour. Colo.—Wyom. Acad. Sci.] 2:39. **Pinto, C.**—O Phlebotomus fischeri, 1926 nao e absolutamente sinonimo do Phlebotomus longipalpis e neiva, 1912. [Ann. Acad. Brasileira Sci. 11: 59-66. (*). **Priddy, R. B.**—Preliminary report on the Bombyliidae of southern California. [13] 31: 1-2. **Reinhard, H. J.**—A review of the Muscoid gen. Eumacronychia with key and descriptions of n. ssp. [6] 47: 57-68. **Rozeboom, L. E.**—The larva of Psorophora (Janthinosoma) horrida (Culicidae). [Jour. Parasit.] 25: 145-147, ill. **Scott, H.**—A new species of Nycteribiidae from islands in the Gulf of California. [Allan Hancock Pacific Exped.] 2: 167-170, ill. (*). **Skufyin, K.**—See under Anatomy. **Stalker & Spencer.**—Four n. spp. of Drosophila with notes on the Funebris Group. [7] 32: 105-112, ill. **Steyskal, G.**—A n. sp. of Dictya (Sciomyz.). [4] 71: 78, ill. **Townsend, C. H. T.**—Note on Paratheresia introduction in Louisiana. [6] 47:38. See under General. **Tulloch, G. S.**—Ecological

notes on mosquitoes associated with Bromeliads. [Jour. Agric. Univ. P. R.] 22: 499-501. **Tuomikoski, R.**—See under Special.

COLEOPTERA.—Balfour-Browne, J.—On Copelatus and Leiopterus (Dytisc.) with descriptions of n. spp. [36] 88: 57-88, ill. **Bartlett, K. A.**—The dung rolling beetle [Canthon pilularius] as a host of a Sarcophid parasite [Carcophaga alcedo]. [12] 32:150. **Benick, L.**—Die Steninen Mittelamerikas (Staph.) [Mitt. Munchner Ent. Gesell.] 29: 12-42, ill. (*). **Blaisdell, F. E.**—Studies in the relationships of the subfamilies and tribes of the Tenebrionidae based on the primary genital characters also descriptions of new species. [1] 65: 43-60, ill. **Brown, W. J.**—Some American spp. of Ludius (Elateridae). [4] 71: 44-49, ill., (*). **Bruch, C.**—Miscelaneas Entomologicas. [Notas del Museo de La Plata] 3: 155-173, ill. (s*). **Buchanan, L. L.**—Changes of names in Carabidae and Rhynchopophora. [10] 41: 79-82. **Cazier, M. A.**—Two new California Acmaeodera. (Buprestid.). [Bull. So. Calif. Acad. Sci.] 37: 137-140. (*), **Darlington, P. J.**—West Indian Carabidae. New forms from the Dominican Republic and Puerto Rico. [Mem. Soc. Cubana Hist. Nat.] 13: 79-101. **Dodge, H. R.**—The bark beetles of Minnesota (Scolytid.). [Univ. Minn. Agric. Exp. Sta.] Tech. Bull. 132: 60 pp. (k) **Knull, J. N.**—Four new Arizona Coleoptera (Cleridae, Corynetidae & Buprestidae). [7] 32: 27-31, ill. **Plank, H. K.**—See under Hemiptera. **Roberts, A. W. R.**—On the taxonomy of Erotylidae with special reference to the morphological characters of the larvae. [36] 88: 89-118, ill., (k). **Ruffo, S.**—Studi sui Crisomelidi. [Boll. Ist. Ent. Bologna] 10: 178-222, ill. **Saylor, L. W.**—Two new California Phyllophaga (Scarab.) [10] 41: 88-91, ill. (k). **Schedl, K. E.**—Some new neotropical spp. of Scolytidae in the collection of the British Museum. [107] B, 8: 12-16, ill. **Smith, F. K.**—Amphizoidae and Haliplidae of Colorado. [Jour. Colo.—Wyom. Acad. Sci.] 2: 37-38. **Straneo, S. L.**—On the genus Abaris (Carab.). [5] 46: 38-41, ill., (Sk*).

HYMENOPTERA.—Bartlett, K. A.—A Dryinid parasite attacking Baldulus maidis in Puerto Rico. [Jour. Agric. Univ. P. R.] 22: 497-498. **Bequaert, J.**—Odynerus annectens and related spp. with additional notes on Odynerus hildago. [7] 32: 58-69, ill. (k*). **Buscalioni & Grandi.**—Il Ficus carcia la sua biologia, la sua coltivazione e i suoi

rapporti con l'insetto pronubo (Blastophaga psenes). [Boll. Ist. Ent. Bologna] 10: 223-279, ill. **Grandi, G.**—Nuovi Agaonidi (Chalcid.) raccolti nel Brasile dal Prof. F. Silvestri. [Bull. Ist. Ent. Bologna] 10: 44-69, ill. (s). **Kinsey, A. C.**—The origin of higher categories in Cynips. [Indiana Univ. Publ.] Sci. Series No. 4 (1936) 334 pp., ill. (k*). **Knowlton & Harmston.**—Utah Hymenoptera. [Utah Agric. Exp. Sta.] Mimeog. Ser. 200: 8 pp. **Muesebeck, C. F. W.**—Five n. spp. of Meteorus (Bracon.). [10] 41: 83-87. **Pierce, W. D.**—The black widow spider and its parasites. [Bull. So. Calif. Acad. Sci.] 37: 101-104, ill. (*). **Smith, M. R.**—A n. sp. of North American Ponera, with an ergatandrous form (Formicid.). [10] 41: 76-78, ill. **Weber, N. A.**—Ants of rare genera and a n. gen. of Ponerine ants. [7] 32: 91-104, ill. (s*).

SPECIAL NOTICES. — Beobachtungen uber das schwarmen und die kopulation einiger Empididen. By R. Tuomikoski. [Ann. Ent. Fennici] 5: 1-30, ill.

SPECIAL NOTICES.—The British Mosquitoes.—By J. F. Marshall. London. 1938. 341 pp., ill. **Entomologische Mededeelingen** van Nederlandsch-Indie. A comparatively recent new journal published by the Entomological Society of the Netherland Indies, Buitenzorg, Java, under editorship of Dr. J. van der Vecht. Published to date: Deel I, 1935: deel 4, no. 4 Dec. 1938. **Zur Kenntnis der** Dryinidae (Sphecoid.) Haupt, H. [Zeit. Naturwissensch.] 92: 13-35, ill. **Die Legewerkzeuge der** Blattwespen (Tenthredinoidea). Zirngiebl, L. [Beit. Naturk. Forsch. Sudwestdeutschland] 3: 39-65, ill. **Pieris bryoniae O.**—und Pieris napi L. By Muller & Kautz. 191 pp., ill. Wien 1938.

A CONTRIBUTION TO THE BIOLOGY OF NORTH AMERICAN VESPINE WASPS. By CARL D. DUNCAN. Stanford University Publications, Biological Sciences, vol. VIII, No. 1, 1939. 272 pp., 54 plates. This elaborate and valuable monograph of the western yellow jacket, *Vespula pensylvanica,* with occasional references to other species, covers three main topics. Two of these are studied in the first section (pp. 13-84), which is a detailed and profusely illustrated account of external morphology, combined with a description of the musculature and its

mechanism. The homologies appear to have been worked out with the utmost care. This section should provide the taxonomist with the correct terminology of sclerites, sutures and areas, not only for the Vespidae but also for most other Aculeata. A brief chapter (pp. 85-97) is devoted to subfamily and generic characters. The bulk of the book (pp. 98-176) is a fascinating account of the biology of *V. pensylvanica,* with frequent glimpses of other species. Among other topics, it discusses hibernation, food and feeding behavior, building activities, life-history and metamorphosis. There is a good description of larva and pupa (pp. 162-166). Instincts and other psychological aspects of wasp behavior are not touched upon. As shown by the "Literature Cited" (pp. 177-184), American writings have been fully considered, European publications (particularly of recent years) very little. As a comprehensive account of one species of social wasp, the book ranks quite high and, it is hoped, will set a standard for other students. Two observations seem to record novel features, at any rate to the reviewer. On two occasions colonies were observed which survived the mild winter of California, being active for part of a second season. One of these was of *V. vulgaris,* the other of *V. pensylvanica.* (pp. 140-141 and 159). Some evidence is also given (p. 170) that *V. maculifrons* might occasionally overwinter as a colony in Florida. The author observed rather frequently that the face of older, unused combs of the nest may be papered over (p. 149). The biological differences pointed out between *Dolichovespula* and *Vespula* (pp. 94 and 96) are essentially the same as those found in Europe by Weyrauch, although both observers reached their conclusions quite independently.—J. BEQUAERT.

Doings of Societies

THE PUGET SOUND ENTOMOLOGICAL SOCIETY.

Entomological workers in western Washington gathered at the University of Washington, Seattle, on Friday, March 10, 1939, and organized The Puget Sound Entomological Society. The objectives of the society are to promote the study of insects, arachnids, and terrestrial arthropods in western Washington, and to promote the mutual welfare of the members through the exchange of ideas at meetings and field trips. Membership is open to persons of good character who are

engaged in entomological activities. The society will hold two regular meetings annually, in February and October, the precise time and place to be determined by the Executive Committee which is composed of three elective officers. The present officers are: Professor Trevor Kincaid, University of Washington, president; Mr. S. E. Crumb, Entomologist, Bureau of Entomology and Plant Quarantine, vice-president, and Dr. E. P. Breakey, Entomologist, Western Washington Experiment Station, secretary-treasurer. Special meetings may be called by the Executive Committee at such time and place as it may determine.

The organization of the Puget Sound Entomological Society was the result of a movement initiated in the fall of 1938 by Dr. Breakey. Thirty-two persons with entomological interests, both professional and hobby, gathered in Puyallup on November 18, 1938. Many spent the afternoon visiting the Western Washington Experiment Station, and the U. S. Bureau of Entomology and Plant Quarantine Field Stations in Puyallup and Sumner. In the evening the group gathered for dinner, after which a discussion was held on the desirability of forming a permanent organization. Dr. Breakey was elected provisional chairman and Mr. Charles F. Doucette, Bureau of Entomology and Plant Quarantine, Sumner, provisional secretary. The chairman appointed a committee on organization: Prof. Melville H. Hatch, University of Washington, chairman, to present a constitution and by-laws for discussion and approval at the next meeting. A nominating committee, Mr. W. W. Baker, Bureau of Entomology and Plant Quarantine, chairman, was also appointed.

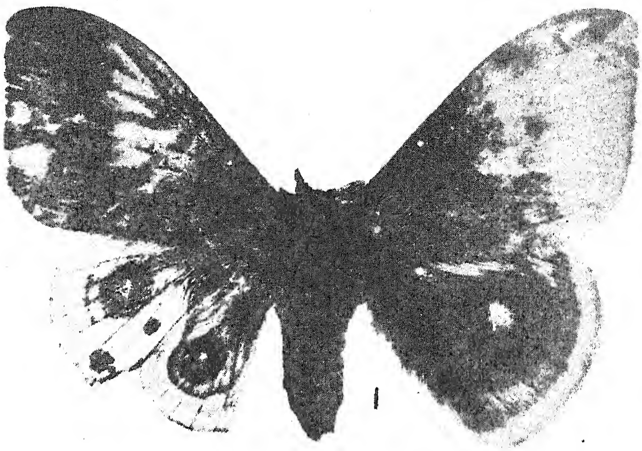
The October meeting is to be held in Puyallup.

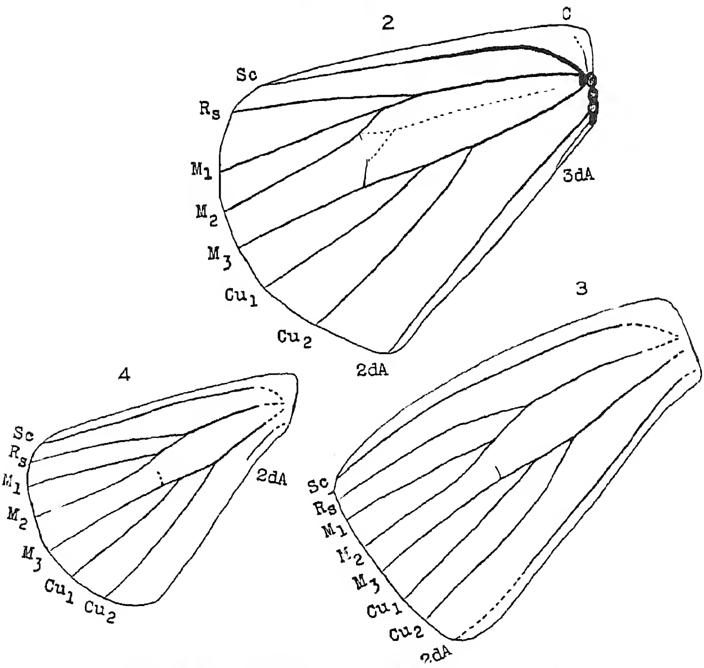
E. P. Breakey, Secretary-Treasurer.

Leptothorax manni Wesson synonymous with L. pergandei Emery (Hymenoptera: Formicidae).

In 1935 (Ent. News vol. 46 pp. 208-210) I described *Leptothorax (Dichothorax) manni* (name preoccupied by *L. manni* Wheeler) from Tennessee and distinguished it from *L. (D) pergandei* Emery to which it was closely allied. Since publication, I have had opportunity to examine much more material in this group, and conclude therefrom that *L. manni* Wesson is synonymous with *L. pergandei* Emery.

L. G. Wesson, Jr.





ABNORMAL IO MOTH, AUTOMERIS IO.—Phillips.

ENTOMOLOGICAL NEWS

VOL. L. JULY, 1939 No. 7

A Male Io Moth (Automeris io) with Two Hind Wings on the Left Side (Lepid.: Saturniidae).

By ROBERT G. PHILLIPS, Norwood, Pennsylvania.

(Plate II.)

This abnormal male Io Moth was collected at Dalmatia, Northumberland County, Pennsylvania, on July 13, 1937, between 9:00 and 9:45 p. m. It was attracted to the lights of the gasoline station operated by H. K. Agnew and R. E. Cleaver, and was captured by one of these men. Previously, I had left a cyanide killing jar and an insect net with them so that insects which were attracted to these lights might be captured. Two other male Io Moths and a Big Poplar Sphinx Moth *(Pachysphinx modesta)* were captured this same evening. I did not observe the abnormal moth until the next morning while mounting these and other insects. It is most unfortunate that the abnormality was not seen before the insect was killed so that its flight might have been observed.

The hind wing shown in figure 2 was drawn from a normal specimen especially prepared to show wing veins, in the Entomological Laboratory of the University of Pennsylvania. There was some question about the presence of the third anal vein (3dA) and the closed cell on this specimen, to which Forbes (1923) refers. Further, there seemed to be a possibility that a rudimentary costa might be present. Consequently, the hind wings of three other normal male Io Moths were studied. These wings were prepared as follows: (a) the wings from one were removed and placed in cedar oil on microscope slides; (b) the wings from another moth were heated for a brief period in a ten per cent solution of potassium hydroxide, washed, spread until dry, descaled with a camel's hair brush, and then placed in cedar oil as in (a); and (c) the third pair of wings were descaled as much as possible with a camel's hair

brush and then placed in cedar oil as in (a). The wings prepared according to method (c) were superior to any used for the study of venation. Study of these wings verified the presence of a rudimentary third anal vein and a rudimentary costa. This costal (?) vein did not seem to be the humerus which is present in some Lepidoptera. The cell was not closed as Forbes (1923) states. There is present, however, a fairly long piece of the lower discocellular projecting anteriorly from M_3 and a shorter piece of the discocellular projecting posteriorly from M_2, but they do not meet. When the wings which were prepared according to method (c) were lifted out of the celar oil, or moved so that no oil covered them, a faint line became visible in the chitin between the radius and the cubitus. This line corresponds to the media in position, although it appears as a slight ridge and is not a vein. The location of this ridge is indicated by the dotted line in figure 2.

Figure 3 illustrates the venation of the anterior hind wing from the left side of the abnormal moth. Neither of the abnormal wings was removed and as a result not all the veins could be seen. The dotted lines indicate the probable locations of veins, or parts of veins, the presence of which could not be determined because something (many scales, etc.) may have obscured them. The third anal vein and the discocellular projection from M_2 could not be seen in this wing, which otherwise seemed to have venation corresponding to the normal wing. The wing is a little smaller than a normal wing and differs somewhat in shape as the figures show. A small projection which appears to be chitinous extends outward on the outer margin from between the subcosta and the radial sector. This peculiar structure is .4 mm. long.

In figure 4 the venation of the posterior hind wing can be observed. The venation corresponds to that of the anterior hind wing except that only a small part of the second anal vein could be seen. The anal edge of this wing is slightly folded and that makes it very difficult to see the second anal vein. Since no part of it could be seen at the distal end there is no

dotted line to indicate its probable existence. This wing is somewhat smaller than the anterior abnormal wing but corresponds more closely to the normal wing in shape. The costal margin of this wing fits under the anal margin of the wing anterior to it. The relationship between the abnormal wings seems to be similar to the relationship which exists between a normal hind wing and a normal fore wing, the wings being entirely separate.

The two abnormal wings vary somewhat from the normal in both shape and size. In color and venation they seem to be almost duplicates of each other and to resemble the normal wing very closely. The third anal vein and the costal vein could not be seen on the abnormal wings but it is easily possible that scales and hairs obscured them completely. The lower discocellular projections were probably hidden in the same manner since only one piece, the anterior projection from M_3 on the anterior hind wing, could be seen.

The complete condition of the veins in these two abnormal hind wings differs, in this case, from those described by Hering (1926): "Ein Übergang zu den monstra per defectum bilden die Fälle, in denen das Auftreten eines überzähligen Flügels beobachtet wurde. So ist berichtet worden von einer *Macrothylacia rubi* L. mit einem überzähligen Hinterflügel; eine *Lasiocampa quercus* L. soll auf der linken Seite zwei Vorderflügel besessen haben. In Wirklichkeit erfolgt hier nicht die Neubildung eines überzähligen Flügels; untersucht man die geschilderten Fälle genauer, so kann man feststellen dass sich der sogenannte fünfte Flügel auf Kosten eines andern entwickelt hat; in Wirklichkeit ist nämlich kein neuer Flügel ausgebildet worden, sondern einer der normalen hat sich geteilt (natürlich in einem sehr frühen Stadium, wahrscheinlich schon in der Imaginalscheibe), so dass aus einem Flügel zwei geworden sind, die aber nur zusammen das Geäder etwa eines Flügels besitzen." (p. 435, lines 13-25).

The wing veins were identified according to Forbes (1923) who shows a figure (415) of the venation of a male *Automeris io*. Comstock (1918) illustrates the venation of *Citheronia*

regalis which corresponds closely to that of *Automeris io*. These two authorities agree on all veins of the hind wing of *Citheronia regalis* except that Comstock labels the most anterior vein as Sc + R_1 (subcosta + first branch of the radius), and Forbes recognizes it as Sc (subcosta). It follows, therefore, that if the wing drawings were labeled according to Comstock the most anterior vein would be labeled Sc + R_1 instead of Sc.

The photograph of the moth (Fig. 1) shows that the abnormal wings are not as well covered with scales as is the normal hind wing. It is possible that some of these scales may have been rubbed off. Two dark spots can be seen posterior to the eyespot on the anterior abnormal wing. These spots are visible on both upper and lower surfaces because of the dearth of scales, and seem to be due to foreign matter which adheres to the ventral surface of the wing. The wing spread of this abnormal specimen is 61 mm., and the wing spread of the normal moth which was used for figure 2 is 58 mm.

This article was written at the suggestion and under the supervision of Dr. Philip P. Calvert, Professor of Zoology, at the University of Pennsylvania.

Literature Examined.

Comstock, J. H. 1918. The Wings of Insects. The Comstock Publishing Co., pp. 64 and 319-346.

Forbes, W. T. M. 1923. The Lepidoptera of New York and Neighboring States. Published by Cornell University, pp. 25, 659-664 and 670.

Hering, Martin. 1926. Biologie Der Schmetterlinge. Verlag Von Julius Springer, pp. 434-436.

Henke, K. und Preiss, J. 1930. Über Naturfunde von Mehrfachbildungen an Schmetterlingsflügeln. Roux Archiv f. Entwicklungsmechanik d. Organismen, 122 (1): 105-116, figs.

Explanation of Plate II.

Figure 1. Photograph of abnormal *Automeris io,* male. Dalmatia, Northumberland County, Pennsylvania; July 13, 1937; by Mr. Herman A. Walters.

Figure 2. Venation of a normal hind wing of *A. io,* ♂. (maximum length — 23 millimeters; maximum width — 17 millimeters.)

Figure 3. Venation of the anterior hind wing of the abnormal *A. io*, ♂. (maximum length—22.5 mm.; maximum width —12.5 mm.)

Figure 4. Venation of the posterior hind wing of the abnormal *A. io*, ♂. (maximum length — 17 mm.; maximum width — 11 mm.)

C, costa; Sc. subcosta; Rs, radial sector; M_1, M_2, M_3, branches of media; Cu_1, Cu_2, branches of cubitus; 2dA, second anal vein; 3dA, third anal vein.

A Questionable Practice in the Bureau of Entomology and Plant Quarantine.

By Henry Fox, Department of Biology, University College, New York University.

It is apparently not a matter of general knowledge that an editorial policy exists in, at least, one of the professedly scientific bureaus of the Government which, as applied in the instance here under review, would appear to have highly questionable ethical implications. In 1935, in response to a request from C. H. Hadley for information desired for an article then being written, I prepared a brief outline of the results to date of a personal study of the conditions likely to influence the distribution of the Japanese beetle on this continent. This paper, which was written after the termination of my employment in the Bureau, was furnished Mr. Hadley upon the strength of an agreement on his part to accord full recognition to the source.

The published article by Mr. Hadley entitled "Progress of Japanese Beetle Investigations" appeared last year (1938) in the June number of the Journal of the New York Entomological Society. An entire paragraph in this article devoted to the question of the ultimate distribution of the beetle is a virtually verbatim transcript of the paper referred to above as furnished Mr. Hadley upon his agreement to accord recognition to the source. In his article as published this recognition is withheld.

Shortly after his attention was called to this evident violation of his agreement, I received a note from Mr. Hadley in which

he disclaimed personal responsibility for the omission, charging that it lay with the Editorial Office of the Bureau of Entomology and Plant Quarantine. He claimed that the original draft of his article contained a footnote in which an unpublished "manuscript" of mine was cited as the source and that this had been deleted by the Editorial Office against his protest.

Inquiry addressed to the Editorial Office elicited from the Chiefs of the Bureau, Lee A. Strong and S. A. Rohwer, information which substantiated the charge made by Mr. Hadley. As justification for the deletion from the latter's article of reference to my contribution, Mr. Strong merely stated that it is the general practice of the Editorial Office of the Bureau to delete references to unpublished reports, giving as a reason the fact that such reports would not be available to the readers of the article. Later, in reply to a letter in which I called his attention to a retention of references to unpublished reports in another article[1], Mr. Rohwer stated that this rule applied only to reports upon officially assigned projects.

By way of comment upon the assumption made by the heads of the Bureau that the paper utilized by Mr. Hadley was a "report" upon an officially assigned subject, I need first to emphasize the fact that the so-called report was written when I was not employed in the Bureau and when, in consequence, I was under no obligation to submit a report upon a study which *officially* came to an end with the terminatiin of my employment. It was prepared, as previously stated, in direct response to a request from Mr. Hadley, was never intended to be a report, or as more than a purely personal contribution to his article. Hence, the assumption that it was an official report, as implied by the Bureau officials, is without justification in fact.

As an additional reason for challenging the right assumed by the Bureau to disregard the obligation of an author to acknowledge the source of his material, I may state that, even during the period of my employment in the Bureau, my study of the conditions likely to influence the ultimate distribution of

[1] Hawley, I. M. and G. F. White. Preliminary Studies on the Diseases of Larvae of the Japanese Beetle. Jour. N. Y. Ent. Soc. 43: 405-412. 1935.

the Japanese beetle was conducted for the most part unofficially, the speculative nature of the inquiry impressing me as unsuitable for an official project. It was only near the close of the period in question that the subject was officially recognized as a formal project of investigation. This came about as a result of repeated inquiries for information received by the Bureau, and referred to me for reply, upon the chances of establishment of the beetle in more or less remote sections of this continent.

At the termination of my official employment this study had not reached a stage at which, in my judgment, publication of the indicated results was desirable. Accordingly, as opportunity offered, it was continued independently, as a matter of personal interest, and the results are embodied in an article written during the past year and since accepted for publication as a contribution from the Department of Biology of New York University. Some of the earlier results of this unofficial extension of the study were included in the outline furnished Mr. Hadley in 1935.

The implied claim of the head officials of the Bureau of Entomology and Plant Quarantine that my brief outline of 1935 represented an official report would thus appear to rest upon a very questionable basis. Nevertheless, the sole reason which those officials have offered to justify the inclusion of the material of that outline in Mr. Hadley's article, without acknowledgment of the source, is the existence in the Bureau of an editorial practice which precludes the citation in publications by its staff of unpublished reports upon officially assigned subjects. It is clear that in the application of this rule some provision needs to be made to guard against possible plagiarism in cases where a writer utilizes material supplied by others, but no hint of the existence of any check of this kind is given in the available official correspondence. Neither is any evidence submitted in the same documents to show that, in the present instance, due consideration was given to the obvious fact that means exist, other than direct citation of unpublished papers, whereby an author can record his obligations.

Immature Staphylinids of the Genus Quedius (Coleoptera: Staphylinidae*).

By RALPH VORIS, Southwest Missouri State Teachers College Springfield, Missouri.

(Continued from page 155.)

QUEDIUS SPELAEUS Horn.

Quedius spelaeus Horn, 1871, Trans. Amer. Ent. Soc. 3:332. Acc Horn, 1878, Trans. Amer. Ent. Soc. 7:158. Blatchley, 1926, 21st. Ann. Rep. Ind. Geol. & Nat. Resources 196. larva.

Egg. Unknown.

Larva. (acc. Blatchley) Length 15. mm.

Head with sides parallel, hind angles rounded; exuviae (in alcohol), testaceous to castaneous. *Clypeo-labral* margin with median tooth one-half length of first lateral; first lateral extremely long, conical; clypeal teeth all distinct, not forming with first lateral a smooth arc as first clypeal is below the arc formed by the third clypeals and the first laterals; clypeal teeth forming an angle of less than 30°. *Ocelli* absent. Antennae with second segment much longer than first; third shorter than second, "gibbous beyond the middle, the gibbosity with an external and an internal long bristle." (Blatchley 96:196); thumb present; fourth segment shorter than third. *Maxillae* with stipes about twice as long as cardo; lacinia slender; palps with three segments subequal in length; second segment with spine on inner surface near base and spine and outer surface near apex; third segment rapidly narrowed near middle continuing slender to the tip. *Labium* with dorsal surface of stipulae, palpigers, and posterior half of ligula densely covered with small spines; palpigers prominent; ligula small; palps with first segment much larger than second.

Abdomen with urogomphus biarticulate, confluently not as long as pseudopode; second segment short, distinct. *Pupa.* Undescribed.

The larvae and adults are said to occur in the caves of southern Indiana and northern Kentucky. Not represented in my collection.

QUEDIUS IRACUNDUS (Say).

Staphylinus fulgidus Fabricius, 1787, Mantissa Insectorum, Hafniae 1:22. acc Erichson, 1840, Genera et Species Coleopterorum 526.

Staphylinus iracundus Say, 1834, Trans. Amer. Phil. Soc. 4:449. Erichson, 1840, Genera et Species Coleopterorum 526.

Quedius fulgidus Erichson, 1840, Genera et Species Coleopterorum 525. Horn, 1878, Trans. Amer. Ent. Soc. 7:158. Blatchley & Wickham, 1896, 21st. Ann. Rep. Ind. Geol. and Hat. Res. 195. Banta. 1907, Carnegie Inst. Washington, pub. 67:31, fig. 3, pupa. Casey, 1915, Memoirs on the Coleoptera 411, 416.

Micrasaurus iracundus Casey, 1915, Memoirs on the Coleoptera 411, 416.

Quedius iracundus Leng, 1920, Cat. Coleop. Amer. N. of Mexico 110.

Egg. Unknown.

Larva. Unknown.

Pupa. Length 7.1 mm., Width 2.8 mm.; anterior margin of prothorax not bearing spines; lateral margins of the fourth, fifth, sixth, seventh, eighth and ninth abdominal segments each bearing one sharp, stiff spine; terminal spines of medium length, sharp; female accessory spines long and sharp.

The material available consists of one exuvia (female) and two adults, loaned by A. M. Banta. The adults were originally identified by H. F. Wickham as *Quedius fulgidus* Fabricius. The material is all from Mayfield's Cave, Bloomington, Indiana, being part of the material on which Banta's "The Fauna of Mayfield's Cave" was based. The adults have the eye and antennal characters mentioned by Casey.

Bibliography.

Banta, A. M. 1907. The fauna of Mayfield's Cave. Carnegie Institute of Washington. Pub. 67.

Blatchley, W. S. and H. F. Wickham 1896. Indiana caves and their fauna. 21st. Ann. Report Ind. Dept. Geol. and Nat. Res. 121-212.

Boving, A. G. & F. C. Craighead 1931. Larval forms of Coleoptera. Entomologicia Americana vol. 11.

Casey, T. L. 1915. Memoirs on the Coleoptera. The New Era Printing Co., Lancaster, Penn. 1: 395-460.

Erichson, G. F. 1840. Genera et species Staphylinorum. Berlin 1-954, pl 1-5.

Fabricius, J. C. 1787. Mantissa Insectorum. Hafniae 1.

Gravenhorst, J. L. C. 1806. Monographia Coleopterorum Micropterorum. Gottingae.

Horn, G. H. 1871. Descriptions of the new Coleoptera of the United States. Trans. Amer. Ent. Soc. 3. 325-344.

Id. 1878. Synopsis of the Quedinii of the United States. Trans. Amer. Ent. Soc. 7: 325-344.
Say, Thomas 1834. Descriptions of North American insects and observations on some already described. Trans. Amer. Phil. Soc. 4: 409-470.
Stephens, J. F. 1832. Illustrations of British Ent. mandibulata. London 5.
Voris, Ralph 1934. Biologic investigations on the Staphylinidae (Coleoptera). Trans. Acad. Sci. St. Louis 8: 233-261.
Xambeu, C. 1910. Moeurs et metamorphosis des Staphylinidae. L'Echange 26:47.

Explanation of Plate I.

Fig. 1. *Quedius capucinus,* dorsal view head. Larva.
Fig. 2. *Quedius capucinus,* lateral view of head. Larva.
Fig. 3. *Quedius capucinus,* ventral view of head. Larva.,
Fig. 4. *Quedius molochinus,* dorsal view right half of head. Larva.
Fig. 5. *Quedius capucinus,* dorsal view. Pupa.
Fig. 6. *Quedius capucinus,* lateral view. Pupa.
Fig. 7. *Quedius capucinus,* ventral view. Pupa.
Fig. 8. *Quedius molochinus,* lateral view head. Larva.
Fig. 9. *Quedius capucinus,* lateral view seventh, eighth and ninth abdominal segment of female. Pupa.
Fig. 10. *Quedius capucinus,* lateral view seventh, eighth, and ninth abdominal segment of male. Pupa.
Fig. 11. *Quedius capucinus,* dorsal view labium. Larva.
Fig. 12. *Quedius molochinus,* ventral view clypeo-labral margin and the arrangement of spines around the mouth. Larva.
Fig. 13. *Quedius molochinus,* antenna. Larva.
Fig. 14. *Quedius capucinus,* antenna. Larva.
Fig. 15. *Quedius capucinus,* dorsal view right maxilla. Larva.
Fig. 16. *Quedius capucinus,* lateral view urogomphus and pseudopode. Larva.
Fig. 17. *Quedius capucinus,* Ventral view clypeo-labral margin and the arrangement of spines around the mouth. Larva.
Fig. 18. *Quedius capucinus,* dorsal, lateral and ventral plates of fourth abdominal segment. Larva.
Fig. 19. *Quedius molochinus,* gular suture and labium. Larva.
Fig. 20. *Quedius molochinus,* lateral view urogomphus and pseudopode. Larva.
Fig. 21. *Quedius molochinus,* ventrolateral view left maxilla. Larva.

A Preliminary Study of the Superfamily Papilionoidea in the Northern Portion of Pine County, Minnesota. (Lepidoptera).

By G. N. Rysgaard, Museum of Natural History,
University of Minnesota.

A three year study of the Papilionidea of Sturgeon Lake, Pine County, Minnesota was made by the author during the summer months of 1936, 1937, and 1938. The period of observation during each summer extended from late June to late August.

The chief objective of the study was to establish locality dates and records for the area, since little work has been done in plotting the distribution of the lepidopteran fauna of this state. The secondary objective was to study the periodicity of abundance and scarcity in order to determine the life cycle periods. Thirdly, it was hoped that information as to local distribution according to habitat areas might be gained.

The area under study embraced many different habitats. A small tract of aged Norway and white pines stands as a nucleus of the area and represents sub-climax conditions; surrounding this and extending over a great proportion of the area is the jack pine forest which represents a still earlier stage of ecological succession. There are hardwood areas of basswood, maple, and oak that nearly equal the coniferous expanses and represent the climax vegetative type for this region. Large tracts of cleared land are maintained in short grass and small floral forms by grazing and recreational activities. Also fields of alfalfa are cultivated. There are two small lakes included in the area, both surrounded by swampland, one being chiefly a cat-tail marsh with an adjoining meadowland slough, while the second consists chiefly of wire grass with a surrounding growth of alder and willow. In addition, a small cranberry bog and an extensive tamarack-spruce swamp are to be found within the borders of the studied area. The shoreline of Sturgeon Lake is sandy, representing the pioneer stage of succession which rapidly dovetails into alder-willow brush succession and

thence into both coniferous and deciduous succession stages. Certain small areas along the beach are low and usually are extremely damp and contain standing water; here cat-tails, swamp milkweed, boneset, sun dew, and other helophytic forms are to be found.

The large number of varied habitats and environmental areas give support to a similar large number of Papilionoidea, forty-two species and three subspecies having been observed during the three year period. Two of this number, the Gulf Fritillary (*Dione vanillae*) and the Macoun's Arctic (*Oeneis macounii*), may be considered stragglers and not indigenous forms.

Following is an annotated list of those species taken during the period of study:*

4\. Black Swallowtail (*Papilio ajax L.*), July 3, 1937.
15\. Tiger Swallowtail (*Papilio glaucus turnus L.*), June 9, 1937.
41\. Orange Sulphur (*Colias eurytheme* Bvd.) August 18, 1937.
42\. Clouded Sulphur (*Colias philodice* Godt.), July 11, 1938.
45\. Little Yellow (*Colias interior* Scud.), July 15, 1937.
75\. Dainty Sulphur (*Nathalis iole* Bvd.), August 20, 1937.
82\. Checkered White (*Pieris protodice protodice* Bwd. & Lec.), July 31, 1937.
82\. Checkered White (*Pieris protodice vernalis* Edw.), June 9, 1937.
83\. Gray-veined White (*Pieris napi* L.), August 4, 1937.
86\. Cabbage Butterfly (*Pieris rapae* L.), August 18, 1937.
89\. Monarch (*Danaus plexippus* L.), August 18, 1937.
96\. Pearly Eye (*Enodia portlandia* Fabr.), July 14, 1937.
103\. Little Wood-satyr (*Megisto eurytus* Fabr.), July 2, 1937.
106\. Eyed Brown (*Satyrodes eurydice* Joh.), July 13, 1937.
117c. Grayling (*Minois alope nephele* Fabr.), July 14, 1937.
125\. Macoun's Arctic (*Oeneis macounii* Edw.), July 2, 1935.
158\. Gulf Fritillary (*Dione vanillae* L.), July 23, 1936.
159\. Variegated Fritillary (*Euptoieta claudia* Cram.), July 23, 1938.
166\. Great Spangled Fritillary (*Argynnis cybele* Fabr.), July 30, 1938.
167\. Silver-spot Fritillary (*Argynnis aphrodite* Fabr.), July 14, 1938.

*Classification reference: Check List of the Lepidoptera of Canada and the United States, J. McDunnough, Memoirs of the Southern California Academy of Sciences, Part I, Macrolepidoptera, June 15, 1938.

167a. Silver-spot Fritillary (*Argynnis aphrodite alcestis* Edw.), July 15, 1938.
171. Mountain Silver-spot Fritillary (*Argynnis atlantis* Edw.), July 13, 1938.
200. Silver-bordered Fritillary (*Brenthis myrina* Cram.), July 31, 1937.
212. Meadow Fritillary (*Brenthis bellona* Fabr), July 12, 1937.
263. Silver Crescent (*Phyciodes nycteis* Dbdy. & Hew.), June 29, 1937.
265. Pearl Crescent (*Phyciodes tharos marcia* Edw.), July 2, 1937.
265. Pearl Crescent (*Phyciodes tharos* Dru.), July 29, 1938.
285. Violet Tip (*Polygonia interrogationis* Fabr.), August 1, 1938.
286. Hop Merchant (*Polygonia comma* Harris), July 29, 1937.
288. Green Comma (*Polygonia faunus* Edw.), July 24, 1938.
294. Gray Comma (*Polygonia progne* Cram.), July 19, 1937.
295. Compton's Tortoise-shell (*Nymphalis j-album* Bvd. & Lec.), July 31, 1937.
297. American Tortoise-shell (*Nymphalis milberti* Godt), August 12, 1938.
298. Mourning Cloak (*Nymphalis antiopa* L.), August 12, 1938.
299. Red Admiral (*Vanessa atalanta* L.), August 3, 1938.
300. Painted Beauty (*Vanessa virginiensis* Dru.), July 31, 1937.
301. Cosmopolite (*Vanessa cardui* L.), August 4, 1936.
303. Buckeye (*Junonia coenia* Hbn.), August 12, 1937.
321. Banded Purple (*Basilarchia arthemis* Dru.), August 4, 1937.
325. Viceroy (*Basilarchia archippus* Cram.), August 4, 1937.
435. American Copper (*Lycaena hypophlaeas* Bdv.), August 5, 1938.
447. Tailed Blue (*Everes comyntas* Godt.), June 26, 1938.
449. Scudder's Blue (*Plebeius scudderi* Edw.), June 27, 1938.
450. Spring Azure (*Plebeius melissa* Edw.), June 29, 1938.
473. Silvery Blue (*Glaucopsyche lygdamus* Dbdy.), June 26, 1937.

The occurrence of the Gulf Fritillary may be accounted for by the fact that a boys' camp is located in the center of the area, and tourists from the South are not uncommon. Possibly this specimen was carried by a car from the South, the speci-

men was badly damaged. It is now in the University of Minnesota collection on the Agricultural College campus. The Macoun's Arctic is found on the northern shore of Lake Superior in the Dominion of Canada, and one was taken by the author on Isle Royale, Lake Superior, in 1934. The Macoun's Arctic is a northern species with its southern limits in lower Canada. Both of these species are first records for Minnesota.

Habitat Areas.

An attempt is here made to ascribe habitat areas to the different species. This is a difficult task, for butterflies are so very active and wander over large areas of varying environmental conditions. In some instances, however, rather definite habitats may be associated with them.

Communities.

Basswood-Maple Climax: No species found commonly in this area, although at its boundaries facing open areas many Nymphalidae are to be observed.

Norway-White Pine Sub-Climax: Nearly devoid of all Papilionoidea.

Jack Pine Forest: The Compton's Tortoise-shell (*Nymphalis j-album*) specimens were all collected in the dense jack pine tracts where there appeared a scattering of birch. This species may be considered the predominant in this habitat; it is practically the sole species of Papilionoidea inhabiting the dense forest. However, where small clearings are made in the jack pine and such plants as blazing star (*Liatris*), wild bergamot (*Monarda fistulosa*), and certain Compositae had appeared, the fritillaries and swallowtails were present in considerable numbers.

Alfalfa Fields: The *Pieridae,* as would be expected, predominate in this habitat, being represented by the Clouded Sulphur (*Colias philodice*), Orange Sulphur (*Colias eurytheme*), Cabbage (*Pieris rapae*), Checkered White (*Pieris protodice* sp.), and Gray-veined White (*Pieris napi*) in order of their abundance. Where thistle was found infesting the alfalfa fields, especially along its borders, the Painted Beauty (*Vanessa virginiensis*) and the larger fritillaries were frequently seen. The greater abundance of the *Colias philodice*

and *Colias eurytheme* probably is explained by the greater amount of available food, clover and vetch, both abundant to excess, being the food plants of the two aforementioned species. The other three Pieridae depended upon the much scarcer Cruciferae, found chiefly in the form of bulbous cress (*Cardamine bulbosa*).

Willow, Alder, and Hazel Brush: In areas of brush bordering open expanses or areas of loose brush, the Grayling (*Minois alope nephele*), Pearly Eye (*Enodia portlandia*), Eyed Brown (*Satyrodes eurydice*), and the Little Wood-satyr (*Megisto eurytus*) were common as were also the *Lycaenidae* represented by the Silvery Blue (*Glaucopsyche lygdamus*), Scudder's Blue (*Plebeius scudderi*), Spring Azure (*Plebeius melissa*), and the Tailed Blue (*Everes comyntas*). This latter group shows preference for the loose brush areas with interspaces of grass and clover. This same type of habitat appeals to the Silver Crescent (*Phyciodes nycteis*) and the Pearl Crescent (*Phyciodes tharos* sp.). The few Meadow Fritillaries (*Brenthis bellona*) taken were all captured here. The large fritillaries should be placed in this group, for it is in the brush country of this type that they are found most abundantly; and it is here that the larvae find food in the numerous violet plants. Their strong wings and wanderlust spirit lead them into nearly all environmental situations, and they may be expected to appear almost anywhere. The large fritillaries may be annotated as the Silver-spot (*Argynnis aphrodite* and also variety *alcestis*), Mountain Fritillary (*Argynnis atlantis*), Great Spangled Fritillary (*Argynnis cybele*), and the Variegated Fritillary (*Euptoieta claudia*). The Banded Purple (*Basilarchia arthemis*) and the Mourning Cloak (*Nymphalis antiopa*) should also be mentioned. Although the larvae of the Mourning Cloak feeds on the willow and may be found in abundance on the willow brush, the adult prefers the open beaches. It must be remembered that many types of willow, which also serve as food, are found growing along the lake shore.

Wire-grass Bog Bordering Interior Lake: The predominant species in this community is the Silver-bordered Fritillary (*Brenthis myrina*).

Cat-tail, Wire-grass, Willow Swamp Surrounding Interior Lake: The Viceroy (*Basilarchia archippus*) is the outstanding species inhabiting this community.

Sand-beach Community: This community is perhaps one of the most interesting of all those studied. An expanse of some thirty yards of scantily vegetated sandy shore surrounds Sturgeon Lake in the area studied and shows progressive succession from the pioneer community at the lake shore to the climax hardwood forest or sub-climax coniferous forest which lies about one hundred yards from the present shoreline and represents the original shoreline. A large portion of this shoreline supports typical sand dune community forms such as the Mutillidae, Bembecidae, Lycosidae, Cicindelidae. In this dry sand area are found the Buckeye (*Junonia coenia*), American Tortoise-shell (*Nymphalis milberti*) and the several *Polygonia.* In the more moist and more advanced areas supporting richer vegetation, the Mourning Cloak (*Nymphalis antiopa*), Red Admiral (*Vanessa atalanta*) and the Painted Beauty (*Vanessa virginiensis*) predominate; and each, in the height of its abundance, swarms on the beach. Low areas near the lake shore have resulted in growths of swamp milkweed, cat-tail, and sedge. Among these are found the diminutive American Copper (*Lycaena hypophlaeas*) and the Dainty Yellow (*Nathalis iole*).

This general distribution of the Papilionoidea as to habitat includes all those forms or species of common occurrence. Others were observed, of course, but not in sufficient numbers to warrant any conclusions being drawn.

(To be continued.)

The Biological Photographic Association.

The ninth annual Convention of the Biological Photographic Association will be held September 14th-16th, at the Mellon Institute for Industrial Research, Pittsburgh, Pennsylvania. The program will be of interest to scientific photographers,

scientists who use photography as an aid in their work, teachers in the biological fields, technical experts and serious amateurs. It will include discussions of motion picture and still photography, photomicrography, color and monochrome films, processing, etc., all in the field of scientific illustrating. Up-to date equipment will be shown in the technical exhibit; and the Print Salon will display the work of many of the leading biological photographers here and abroad.

The Biological Photographic Association was founded nine years ago because of the growing need for expert illustrative material for scientific research and teaching. Many workers were solving their problems in their own way. But obviously they were wasting time and effort in individually repeating experiments that had been worked out elsewhere. The B. P. A. was formed to act as a clearing house for new ideas, to pool experiences, record standard procedures and disseminate information. Its aims were scientific and all services have been volunteered by officers and members on a non-profit basis.

Further information about the Association and the Convention may be obtained by writing the Secretary of the Biological Photographic Association, University Office, Magee Hospital, Pittsburgh, Pennsylvania.

The Nomenclature of Categories Lower than Species.[1]

By Curtis W. Sabrosky, Michigan State College.

A series of recent papers (1936-1938) has served to demonstrate the present uncertainty in the basic principles of the nomenclature of categories lower than species. The various interpretations of the nomenclatorial rules relating to this problem are so conflicting that it seems desirable to review them and to point out the complications into which they are leading us.

Prevailing Interpretations of the Rules.

The International Rules of Zoological Nomenclature actually mention only "subspecies" as lower than species, with no indication of the meaning and scope of the term. It is also stated that scientific names are "trimonial for subspecies".

[1] Journal Article No. 356 (n. s.) from the Michigan Agricultural Experiment Station.

These brief references appear to be interpreted in four principal ways among contemporary taxonomists, as follows:

1. *"Subspecies" includes all categories of lower rank than species;* therefore, all properly proposed names for such categories are valid and available.

One can infer that many taxonomists believe this, for in practice they propose infra-specific names—polynomials as well as trinomials—in proper Latin form, designate them as new, and accompany them with description and designation of type. Others use them, literature references pile up, biological data accumulate, changes of status are made, and soon the name is firmly entrenched in our voluminous literature.

2. *"Subspecies" in the Rules designates a definite concept, and is trinomial in form;* therefore, names of lower categories and polynomials are invalid and unavailable under the Code (e. g., Krombein, 1938, pp. 185, 186: "a varietal name has no status in nomenclature").

Like Krombein, Riley (1938, p. 31) maintains that names of categories lower than subspecies have "no status in scientific nomenclature". A trinomial form validates a name under the Rules, but only if it is definitely stated to be a subspecies, or in the absence of any statement to the contrary. If an author published a trinomial with the third name designated as "n.ab.", therefore, it would be rejected by Riley, although accepted by Hovanitz (see no. 3) with both claiming the correct interpretation of the Rules. Riley's deductions may not entirely bar the acceptance of names proposed as new races and varieties, if those names are regarded as *coequal* with and not *lower* than subspecies.

3. *The Rules recognize only one "subspecific" category, but trinomials are available regardless of their original rank.* (Hovanitz, 1938, p. 40: "Names proposed as bi- or trinomials are unaffected as to availability by reason of their having been originally described as of a biological category not generally considered of taxonomic significance.").

Thus the numerous names, particularly in Lepidoptera, which appear as new forms, aberrations, etc., are regarded as valid

if proposed in trinomial form, but unavailable if not. Riley (1938) has pointed out some objections to this conception.

4. *"Subspecies" of the Rules is the name for a concept regarded as an incipient species,* i. e., one stage in the process of speciation during which, by natural selection, isolation, or other factors, certain populations gradually assume a homogeneous distinctiveness from the parent stock.

This interpretation would accept the names of races, varieties, etc., when these are regarded as evolutionary elements [2], but would reject names for aberrations, color forms, seasonal forms, etc., as contrary to the spirit of the Code. One must admit that it might be difficult to agree upon "evolutionary stages."

The viewpoint is more selective than Hovanitz' (3), and shows a broader recognition of terminology than that of Krombein and Riley (2). Most taxonomists who habitually use the terms variety (in one sense at least) and race in proposing new names undoubtedly believe that these names are valid under our system of nomenclature. In many orders of insects the term "subspecies" seldom appears, whereas variety (Diptera, Hymenoptera in part) and race (Orthoptera, Odonata) are frequently used for the third rank in a trinominal combination.

PROBLEMS.

Among these diverse conceptions, certain problems can be recognized as of paramount importance.

Problem 1. What is the meaning of "subspecies"? Should the Rules be construed to mean *one* category which must be designated "subspecies", or should a more inclusive interpretation prevail?

In actual practice, I believe we shall find that the discarding of all names other than definitely designated "subspecies" would overthrow a vast amount of valuable taxonomic work, both past and present, and would contribute far more to confusion than a strict interpretation could hope to counterbalance. A few prominent examples from current usage may be adduced to illustrate the point.

[2] Bates, 1935, p. 71: "The term subspecies . . . might well be applied to any partially independent population considered to represent an evolutionary stage in the development of species."

(a). In his highly valued monograph on the genus *Cynips* (1930), Kinsey recognized the lack of uniformity in terminology, and adopted the term "variety" for his trinomial combinations. He pointed out, especially with maps, the geographical isolation of these "varieties", showing that they correspond indeed to race, subspecies or choromorph of other authors. In view of the possible doubt on the validity of names proposed as "varieties" (cf. Krombein), it is interesting to note that Kinsey later (1936) abandoned his use of the term and proposed to use *species* for all of his units previously called *varieties!* It may also be mentioned that his elevation of varieties to the rank of species thereby made trinomials of his quadrinomial names for the bisexual and agamic forms.

(b). It is significant that a widely quoted book, "The Species Problem" by G. C. Robson (1928), uses the word *variety.* I find only two mentions of "subspecies" in the entire book: one is a mere reference (p. 198) to a Pleistocene form of a modern species; the other is a footnote on p. 26 to the effect that "the term 'subspecies' is often used instead of 'variety' to denote well-marked subdivisions of species". The preference to the use of "variety" in this notable work by an English zoologist is but one more strong indication that we should not generalize too arbitrarily on names other than "subspecies".

(c). The difficulty of applying rules of nomenclature to the terminology of older works is illustrated in Creighton's discussion of the development of infra-specific ranks in Formicidae. As he points out (p. 4), the early use of "variety" (Emery, about 1885) was equivalent to the term "race" of Forel (1874). Emery introduced the name "subspecies" in the early 1890's, and the latter eventually supplanted the term "race". Within the past few years the term choromorph has also been used. Creighton closes the matter very neatly in these words (p. 9): "If most subspecies and varieties are choromorphs why need we longer attempt to distinguish between the two ranks? *Such a separation has always rested on an auctorial basis which cannot be subjected to analytical evaluation*". (italics are mine).

Problem 2. What is namable? Do all the named categories really deserve formal Latinized designations which would enter into nomenclature?

The question of whether various forms (aberrations, etc.) deserve names is a moot problem. The viewpoint of a body of Lepidopterists, in America at least, is that these should be named; the opposing view is concisely set forth by Ferris and Doudoroff (1936).

Problem 3. Should polynomials (quadrinomials, etc.) and names for categories lower than subspecies (sensu lato) be recognized in nomenclature?

An affirmative answer to this question would probably involve changes in the Rules, or at least a much broader interpretation than many would grant at present. In part, the question would be answered by settling the other problems.

It cannot be denied, as Riley has pointed out, that polynomials are names for things; the problem of nomenclature is what to do with the names. One Lepidopterist (Bates, 1935, p. 74) has remarked: "It seems to me that the Linnean nomenclature, if it is not to become hopelessly unwieldy, is best restricted to the classification of populations. The classification of individuals within the population — of seasonal forms, aberrations, dimorphic female forms, and the like—is essentially a separate problem." Although Bates definitely opposes the acceptance of such forms as nomenclatorial units, it is evident from his reference to unwieldiness that he considers the names already proposed as available under the Rules.

If we agreed with Hovanitz that polynomials are unavailable under the Code, what would prevent subsequent authors from proposing aberrations, etc., as trinomials, thus fulfilling his requirement for nomenclatorial status? But it seems incongruous to insist that a name is acceptable if proposed as *Erebia ligea* ab. *subcaeca* (trinomial), but unavailable if proposed as *Erebia ligea carthusianorum* ab. *subcaeca!* In both cases, the name, the "ab.", the concept, and the intent of the author are the same. Can one be rejected but the other accepted?

The position taken by Ferris and Doudoroff appears to be a

fair one, meriting the considered thought of all who deal with infra-specific categories. It may be summarized, perhaps a bit too bluntly, in three points:

(a). If you name any form, then consider the name in nomenclature.

(b). If a name is not to be recognized in nomenclature, don't name it.

(c). If you don't name it, and still wish to designate it in some way, then construct another system which will *not* enter into and complicate nomenclature (e. g., symbols in genetics, terminology of aphid life history, use of common names such as spring form, etc.).

Conclusions.

Whatever step is chosen, the whole situation points to the following *needs* of modern systematic zoology, especially in entomology:

1. A ruling as soon as possible on what names enter into nomenclature, defining the terms with fairness to all authors, with consideration for difference of usage, and with a view to avoiding confusion wherever possible.

2. Agreement on what is namable, and how to handle the remaining categories.

3. Acceptance of all past properly proposed names, of whatever rank, as entering into nomenclature and establishing priority. If we declare polynomials unavailable, repropose some, validate more recent names because of trinomial form, etc., etc., our taxonomy cannot help but be more or less confused. The literature will contain publications from authors with opposing views of validity. The tangle of available and unavailable, of valid and validated, of proposed and reproposed and unreproposed names, will be a morass of nomenclature for future taxonomists.

In the meantime, why assume that any one interpretation is the correct one, and make revisions accordingly? In the absence of an official opinion or interpretation, Riley, Hovanitz, Krombein, and others speak positively of their correct understanding of the Rules, and publish accordingly. But is all this scientific?

Must we pile error upon error, and revise errors with further errors, only to have to revise the whole situation again when a ruling finally becomes available? Can we not bide our time, seek a ruling which will clarify the entire situation, and thereby avoid further contributions to confusion? I believe in that way we can contribute far more to taxonomy than can be done either by insistence on one's own interpretation or by the complacent assumption of most taxonomists that their customary procedure is valid.

Literature Cited.

BATES, MARSTON. 1935. The butterflies of Cuba. Mus. Compar. Zool., Harvard University, Bul. LXXVIII (2), pp. 63-258.

CREIGHTON, WILLIAM S. 1938. On Formicid nomenclature. Jour. N. Y. Ent. Soc. XLVI, pp. 1-9.

FERRIS, G. F., and DOUDOROFF, MICHAEL. 1936. Taxonomic problems in Lepidoptera. Ent. News, XLVII, pp. 124-128.

HOVANITZ, WILLIAM. 1938. The interpretation of the term subspecies and the status of names applied to lower categories in Lepidoptera. Ent. News, XLIX, pp. 39-41.

KINSEY, A. C. 1930. The gall wasp genus Cynips. Indiana Univ. Studies, XVI, 577 pp.

KROMBEIN, KARL V. 1938. Corrections and additions to a recent catalog of the Tiphiidae. Ent. News. XLIX, pp. 184-189.

RILEY, N. D. 1938. When is a name a subspecific name? Ent. News. L, pp. 31-33.

ROBSON, G. C. 1928. The species problem. London, Oliver and Boyd. 283 pp.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.
The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( )follows; then the pagination follows the colon :
Papers published in the Entomological News are not listed.

GENERAL. — **Barber, H. S.** — Adhesives for mounting insects. [Ward's Ent. Bull.] 6: 1-2. **Berlese, A.** — Commemorazione di. By A. Melis. [Redia] 24: vii-xix, ill. **Bromley, S. W.**—Shipping insect collections. [Ward's Ent. Bull.] 6: 3, ill. **Carpenter, G. H.**—Obituary. By C. B. M. [Irish Nat. Jour.] 7: 138-141, ill. **Dice, L. R.**—The Sonoran biotic province. [84] 20: 118-129, ill. **v. Frankenberg, G.** — Winke für die anfertigung von dauerpräparaten. [Mikrokosmos] 32: 121-126, ill. **Hetrick, L. A.**—Preserving life history specimens. [Ward's Ent. Bull.] 6: 3-4. **Jacques, Munro, Whelan & Kimball.**—Miscellaneous light traps. [Ward's Ent. Bull.] 6: 1-2, ill. **Jordan, K.**—Where subspecies meet. [Novitates Zool.] 41: 103-111, ill. **Koidsumi, K.**—Some remarks on the theory of "Summation of accumulated temperature." [Kontyu] 12: 213. **Marshall, W. S.**—Labelling insect collections. [Ward's Ent. Bull.] 6: 4. **Palm, C. E.**—The Charles Schaeffer Collection. [19] 34: 80. **Reed, C. F.**—Collecting insects in winter. [Bull. Nat. Hist. Soc. Maryland] 9: 39-42, ill. **Shadle, A. R.** — Dryer and protector for insects. [12] 32: 343-344, ill. **Shoup, C. S.**—An annotated bibliography of the zoology of Tennessee and the Tennessee Valley Region. Part 6. Arachnida. Part 7. Insecta. [Amer. Midland Nat.] 21: 599-610. **Spacek, K.** — Prof. Dr. Embrik Strand 60 Jahre. [Fest. 60 Geburts. Prof. E. Strand] 5: 1-55. **Strong, Fleury & McLaine.**—The transportation of live insects. [Ward's Ent. Bull.] 6: 4. **Walker, James John.**—Obituary by E. B. Poulton.

ANATOMY, PHYSIOLOGY, ETC. — **Abbott, C. E.** — The senses of spiders. [19] 34: 101-110. **Asahina, S.** — Lautapparat von Epiophlebialarve. [Kontyu] 12: 225-226. **Banks, C. J.** — On the occurence of nematodes in Corixa geoffroyi (Hemipt.: Corixidae). [J. Soc. Brit. Ent.] 1:217-219, ill. **Bellucci, R.** — The respiratory metabolism of starved Japanese beetle larvae (Popillia japonica) at different relative humidities. [Physiological Zoology] 12:

50-56, ill. **Bhatia, Madan Lal.**—On some larval stages of two species of Ichneumonidae, Bassus tetragonus and Homocidus fissorius, parasitizing Sphaerophoria flavicauda (Syrphidae). [116] 30: 503-510, ill. **Brauns, A.**—Morphologische und physiologische Untersuchungen zum Halterenproblem unter besonderer Berucksichtigung brachypterer Arten. [89] Abt. Allg. Zool., 59: 245-391, ill. **Braun, W.**—Contributions to the study of the development of wing-pattern in Lepidoptera. [92] 76: 226-240, ill. **Burtt, E. T.**—Control of metamorphosis in Lepidoptera. [31] 143: 771. **Catala, R.**—Acceleration par des chocs de la metamorphose des chenilles de Chrysiridia madagascariensis (Uraniid.). [Comptes Rend. Sea. Acad. Sci.] 208: 1349-1351, ill. **Chadwick, L.**—Some factors which affect the rate of movement of the wings in Drosphila. [Physiological Zoology] 12: 151-160, ill. **Ciaccio, G.**—Osservazioni in campo oscuro e a luce ordinaria sui nuclei delle ghiandole salivari di "Chironomus." [Rendiconti] 29: 89-94. **Ellenby, C.**—Metabolic rate of early vestigial and wild-type prepupae of Drosophila melanogaster in relation to genotype, sex and size. [93] 108, A: 525-538, ill. **Gerasimov, A. M.** — See under Lepidoptera. **Gohrbandt, I.**—Ein neuer typus des tympanalorgans der Syntomiden. [34] 126: 107-116, ill. **Graham-Smith, G. S.**—The generative organs of the blow-fly, Calliphora erythrocephala, with special reference to their musculature and movements. [116] 30: 441-476, ill. **Hetrick, L. A.**—The morphology of the head of the scorpion-fly. [Pro. Louisiana Acad. Sci.] 2, (1935): 113-120, ill. **Hodge, C.**—The anatomy and histology of the alimentary tract of Locusta migratoria (Orth.: Acridid.). 64: 375-400, ill. **Hughes & Hughes.** — The internal anatomy and post-embryonic development of Glycyophagus domesticus (Acarina). [93] 108, B: 715-733, ill. **Hungate, R. E.**—Experiments on the nutrition of Zootermopsis. III.—The anaerobic carbohydrate dissimilation by the intestinal protozoa. [84] 20: 230-245, ill. **Imms, A. D.** — On the antennal musculature of insects and other arthropods. [53] 81: 273-320, ill. **Inaba, S.** — On the salinity tolerance of larva and pupa of the mosquito (Ochlerotatus sp.). [Kontyu] 12: 216-219. **Kessel, E. L.**—The embryology of fleas. [Smith: Miscell. Coll.] 98: 78 pp., ill. **Knetsch, H.**—See under Orthoptera. **Ludwig, D.**—The effect of temperature on the size of the columnar cells of the mid-intestine of the Japanese beetle larva (Popillia japonica). [Physi-

ological Zoology] 12: 209-213. **Maki, Takadi.**—Studies on the thoracic musculature of insects. [Mem. Fac. Sci. & Agr. Taihoku Imp. Univ.] 24, no. 1, pp. 1-342, ill. **Miller, A.**—The egg and early development of the stonefly, Pteronarcys proteus (Plecoptera). [Journ. Morph.] 64: 555-609, ill. **Moon, H. P.**—The growth of Caenis horaria, Leptophlebia vespertina and L. marginata (Ephemerida). [93] 108, A: 507-512, ill. **Piepho, H.**—Raupenhäutungen bereits verpuppter hautstücke bei der wachsmotte Galleria mellonella. [Die Naturwissensch.] 27: 301-302, ill. **Plagge, E.**—Das verpuppungshormon der schmetterlinge. [Forschung. und Fortsch., Berlin] 15: 175-177, ill. **Pochon, J.**—Flore bacterienne cellulolytique du tube digestif de larves xylophages. [Comptes Rendus. Sea. Acad. Sci., Paris] 208: 1684-1686. **Pumphrey & Rawdon-Smith.**—"Frequency discrimination" in insects: a new theory. [31] 143: 806-807. **Roeder, K. D.**—The action of certain drugs on the insect nervous system. [92] 76: 183-189. **Schmidt, W. J.**—Herstellung von Praparaten zur polarisationsoptischen Untersuchungen der Chromosomen in der Speicheldrusenkernen der Chironomuslarven. [Zeitschr. wissen. Mikrosk.] 56: 1-7, ill. Ueber den polarisationoptischen Nachweis des Chitin bei Tierens und Pflanzen. [Zeitschr. wissen. Mikrosk.] 56: 24-56, ill. **Simoidumi & Inaba.**—On the low temperature limit of activity of Dineutus orientalis. [Kontyu] 12: 220-222. **Ssinitza, T. J.**—Zur biologie einiger vertreter der Schlammchironomiden. [Wissenschaft. Ber. der Moskauer Staatsuniv] H. 9, (Biol.) 1936: 162-185, ill. (Russian with German summary). **Strouhal, H.**—See under Coleoptera. **Takahashi, Y.**—On the imaginal feature of Chlorops oryzae. [Trans. Kansai Ent. Soc.] No. 8: 58-63, ill. **Thorpe & Caudle.**—A study of the olfactory responses of insect parasites to the food plant of their host. [116] 30: 523-528. **Tischler, W.**—See under Hymenoptera. **Warren, E.**—The genital system of Hypoctonus formosus (Thelyphonid.). [An. Natal Mus.] 9: 307-343, ill. **Wiesmann, R.**—Untersuchungen über die struktur der kutikula des puppentönnchens der kirschfliege, Rhagoletis cerasi. [Viertel. Naturf. Ges. Zurich] 83: 127-136, ill. **Wigglesworth, V. B.**—Häutung bei imagines von wanzen. [Die Naturwissensch.] 27: 301. **Yagi, N.**—Detection of dipterous parasite of the silk worm pupa by the action current. [Kontyu] 12: 226-227, ill. **Zirngiebl, L.**—Veränderungen am flügelgeäder von Xiphydria prolongata. [Abhand. Naturwiss. Ver. Bremen] 31: 106-108, ill.

ARACHNIDA AND MYRIOPODA.—**Braendegaard, J.** —1. Supplementary list to Spiders (Araneina) from southeast Greenland. II. Arctosa alpigena og Arctosa insignita (Lycosidae). [Meddel. om Gronland] 108: 11 pp., ill. **Cooley, R. A.** — The genera Dermacentor and Otocentor (Ixodid.) in the United States, with studies in variation. [Nat. Inst. Health] Bull. 171: 89 pp., ill. (k). **Gertsch & Jellison.**—Notes on a collection of spiders from Montana. [40] No. 1032: 13 pp., ill. **Gertsch, W. J.**—A new genus in the Pholcidae. [40] No. 1033: 4 pp., ill. **Hoffman, C. C.** — Nuevas consideraciones Acerca de los Alacranes de Mexico. [112] 9: 317-337, ill. **Holm, A.** — Beiträge zur biologie der Theridiiden. [Fest. 60 Geburts. Prof. E. Strand] 5: 56-67, ill. **Hubbard, W. E.**—Entonyssus ewingi n. sp., an Ophidian lung mite. [Amer. Midland Nat.] 21: 657-662, ill. **Hutson, L. R.**—A list of parasites recovered from poultry in Antigua, B. W. I. [Trop. Agric., Trinidad] 16: 108. **Kolosvary, G.**—Ueber die phylogenie der spinnentiere. [Fest. 60 Geburts. Prof. E. Strand] 5: 459-462. **Lombardini, G.**—Chiave analitica ai sottordini alle superfamiglie ed alle famiglie degli Acari. [Redia] 24: 199-217, ill. **Oudemans, A. C.**—See under Special. **Petrunkevitch, A.**—Catalogue of American spiders. [Trans. Conn. Acad. Arts & Sci.] 33: 135-338. (k). **Quaassdorff, W.**—Ungebetene gäste im mehlkasten. [Mikrokosmos] 32: 132-133, ill. **Volk, O. H.** — Ein wehrhaftes Tiergeschlecht. Beobachtungen am feldskorpion. [Kosmos] 36: 167-168, ill. **Warren, E.**— See under Anatomy. **Werner, F.**—Neu-eingänge von skorpionen im Zoologischen Museum in Hamburg. II. Teil. [Fest. 60 Geburts. Prof. E. Strand] 5: 351-360, ill. (s).

THE SMALLER ORDERS OF INSECTS. — **Ahrens, C.**—A dragonfly cosmopolite. [Nat. Mag.] 32: 349-350, ill. **Bick, G. H.** — Observations on the biology of dragonfly nymphs. [Pro. Louisiana Acad. Sci.] 4: 261. **v. Frankenberg, G.**—Das ei der Florfliege. [Natur und Volk] 68: 606-612, ill. **Hathaway, E. S.** — The diagnosis of dragonfly nymphs of the genus Libellula. [Pro. Louisiana Acad. Sci.] 4: 262. **Hetrick, L. A.**—See under Anatomy. **Hopkins, G. H. E.** — Straggling in the Mallophaga. [9] 72: 75-77. **Hutson, L. R.** — See under Arachnida. **Ionescu, M. A.**—Taxonomische studien an Proturen. [34] 126: 148-153, ill. **Jordan, K.**—On some Nearctic Siphonaptera. [71] 41: 119-124, ill. (*). On some neotropcal Siphonaptera. [Novitates Zool.] 41: 164-169, ill. (*). On the spp. of bird-

Parapsylli from the Falkland Islands obtained on the British Graham Land Expedition, 1934-37. [71] 41: 134-139, ill. (*). **Kessel, E. L.**—See under Anatomy. **Knowlton & Harmston.** — Utah Insects. [Utah Agric. Exp. Station] Mimeogr. Ser. 200: 6 pp. **Sharp, S. S.**—Important thrips in Louisiana. [Pro. Louisiana Acad. Sci.] 4: 153-156. **Wright, M.**—Additions to the list of anisopterous dragonflies of the central Gulf Coast Region. [Jour. Tenn. Acad. Sci.] 14: 203-208.

ORTHOPTERA.—Knetsch, H.—Die korrelation in der ausbildung der tympanalorgane, der flugel, der stridulationsapparte und anderer organsysteme bei den Orthopteren. [52] 8: 1-69, ill. **Uvarov, B. P.**—Twenty-four new generic names in Orthoptera. [75] 3: 457-459.

HEMIPTERA. — Banks, C. J. — See under Anatomy. **Brown, H. E.**—An annotated list of the species of Jassinae known to occur in Indiana (Cicadellid. [Amer. Midland Nat.] 21: 663-673, ill. **Elliott, D. C.**—The assassin bugs of south Louisiana (Reduviidae). [Pro. Louisiana Acad. Sci.] 4: 34-40. (k). Aphid notes from Louisiana. [Pro. Louisiana Acad. Sci.] 4: 170-174. **Hungerford, H. B.** — A note on Sigara griffini (Corixidae). [103] 12: 72. **Johnston, H. G.** — Five n. spp. of Miridae from Texas. [19] 34: 129-133. **Osborn, H.**—The Fulgoridae of Ohio. [Ohio Biol. Surv.] Bull. 35: 283-357, ill. (k). **Palmer, M. A.** — Two unusual species of aphids infesting wheat. [12] 32: 345-346, ill. **Rosewall, O. W.**—Notes on the Pentatomidae of Louisiana. [Pro. Louisiana Acad. Sci.] 4: 237-240. **Ruckes, H.** — Three n. spp. of Brochymena (Pentatomidae) from the United States and Mexico. [19] 34: 111-118, ill. **Torre-Bueno, J. R. de la.**—Andrallus spinidens F. in the U. S. (Pentatom.). [19] 34: 118.

LEPIDOPTERA. — Braun, W. — See under Anatomy. **Brown, F. M.**—New forms and spp. of the gen. Catasticta. I. (Pieridae). [19] 34: 120-128. **Busck, A.**—Restriction of the genus Gelechia (Gelechiid.), with descriptions of new genera. [50] 86: 563-593, ill. **Clark, A. H.**—The butterflies of Virginia. [Explor. & Field-Work Smiths. Inst. 1938] 1939: 65-68, ill. **Ferreira D'Almeida, R.** — Contribution a l'etude des Mechanitidae (Danaoid.). [Lambillionea] 1939: 78-81. (*s). **Fletcher, T. B.** — Zeller's Versuch: March, 1839. [21] 51: 37-38. **Gerasimov, A. M.**—Die Chaetotaxie des analsegments der raupen. [64] 24: 50-59, ill. **Gohr-**

bandt, I.—See under Anatomy. **Holik, O.**—Quelques problemes au sujet du genre Zygaena. [Lambillionea] 1939: 82-89, cont. **McAlpine, W. S.**—A new metal mark (Calephelis) from Texas (Rhiodinid.). [19] 34: 75-80, ill. **Pagast, F.**—Zur rassen-und artbildung in der Papilio machaon-gruppe. [88] 27: 312-317, ill. **Vazquez, L.** — Contribuciones al conocimiento de los lepidopteros Mexicanos. [112] 9: 307-316, ill. **Wills, M. M.**—"Serpent" of caterpillars. [Nat. Hist.] 44: 1-2. (s).

DIPTERA. — Alexander, C. P. — New or insufficiently known crane-flies from the Nearctic region (Tipulidae). Pt. 5. [19] 34: 92-100. **Cleare, L. D.** — The Amazon fly (Metagonistylum minense) in British Guiana. [22] 30: 85-102, ill. **Curran, C. H.** — The species of Macromya Tachinid.). [40] No. 1020; 3 pp. (Sk*). The dipterous genus Chrysotachina (Tachinid). [40] No. 1021; 3 pp. (k*). The human bot fly. [Nat. Hist.] 44: 45-48, ill. Synopsis of the American species of Volucella (Syrphid.). [40] Nos. 1027 & 1028: 7 pp., 17 pp. Four new species of Sobarocephala (Clusiidae). [40] No. 1029: 2 pp. Two new American Diptera with notes on Asemosyrphus. [40] No. 1031: 3 pp. **Heiss, E. M.** — A classification of the larvae and puparia of the Syrphidae of Illinois exclusive of aquatic forms. [Univ. Ill. Bull.] 36: 142 pp., ill. **Horsfall, W. R.**—Habits of Aedes thibaulti (Culicidae). [103] 12: 70-71. **Knowlton, Harmston & Stains.**—Insects of Utah. Diptera. [Utah Agric. Exp. Sta.] Mimeog. Ser. 200, Pt. 5: 22 pp. **Mayne, B.**—See under Special. **Reichert, A.**—Lausfliegen. [Natur und Volk] 69: 82-86, ill. **Reinhard, H. J.**—N. genn. and spp. of Muscoid Diptera. [19] 34: 61-74. **Ssinitza, T. J.**—See under Anatomy.

COLEOPTERA.—Balthasar, V.—Neue arten der gattung Scatimus [Fest. 60 Geburts. Prof. E. Strand] 5: 87-91. (s k). **van Emden, F.** — On some little-known or new Adelognathous Curculionidae. [75] 3: 422-426. (S). **Fiedler, C.** — Neue sudamerikanische arten der gattung Rhyssomatus (Curc. Chryptorhynch.). [Ent. Nachrich.] 12: 81-96, cont. (*). **Liebke, M.**—Neue laufkäfer. [Fest. 60 Geburts. Prof. E. Strand] 5: 91-130, ill. (s). **Pic, M.**—Coléoptères nouveaux, principalement de Chine. Malacodermes. [L'Echange Rev. Linne.] No. 476: p. 4. (s*). **Reinhard, H. J.**—New and little known Phyllophaga from Texas (Scarab.). [103] 12: 47-63, ill. **Ritcher, P. A.** — Observation on white grub pupation. [103] 12: 64-69.

Siepmann, C. G.—Hister puncticollis a synonym of Hister osculatus. [19] 34: 74. **Strouhal, H.**—Variationstatistische untersuchung an Adonia variegata (Coccinell.). [46] 35: 288-316, ill. **Uhmann, E.** — Amerikanische Hispinen aus ·· Rerliner Museum. IX. Teil. Die gattungen Octhispa, ⁻·obaenia, Acanthodes, Cnestispa und Pentispa. ırts. Prof. E. Strand] 5: 317-345. (*).

ʀ.. ?TERA.—**Breland, O. P.**—New Mexican Callimomidae. [19] 34: 81-91. **Frohne, W. C.**—Semiaquatic Hymenoptera in North Michigan Lakes. [Trans. Amer. Micro. Soc.] 58: 228-240, ill. **Gontarski, H.**—Zur biologie der schlupfwespe Dibrachys cavus. [46] 35: 203-220, ill. **Hanson, H. S.**—Ecological notes on Sirex wood-wasps and their parasites. [22] 30: 27-76, ill. **Hedicke, H.**—Hymenopterorum Catalogus. Pars 9. Evaniidae. 50 pp. Hymenopterorum Catalogus. Pars 10. Aulacidae. 28 pp. Hymenopterorum Catalogus. Pars 11. Gasteruptiidae. 54 pp. **Lohrmann, E.** — Formenketten und stammbaume in der grabwespengruppe der Bembicinen. [52] 8: 130-144, ill. **Maidl & Klima.** — Hymenopterorum Catalogus. Pars 8. Sphecidae I. (Astatinae-Nyssoninae. 150 pp. **von Szelenyi, G.**—See under Special. **Tischler, W.**—Zur ökologie der wichtigsten in Deutschland an getreide schädlichen Pentatomiden II. [46] 35: 251-287, ill. **Zirngiebl, L.** — See under Anatomy.

SPECIAL NOTICES.—Die Holarktis.—Ein beitrag zur diluvialen und alluvialen geschichte der zirkumpolaren faunen und florengebiete. By W. F. Reinig. Published by G. Fischer. Jena. 1937. 124 pp., ill. **Graphic reproduction** of the life cycle of the malaria parasite in the mosquito host. By B. Mayne. [Nat. Inst. Health] Bull. 170: 15 pp., ill. **Melanismus,** Albinismus und Rufinismus. Von W. F. Reinig. Published by G. Thieme. Leipzig 1937. 122 pp., ill. **Neue Funde auf** dem Gebiete der Systematik und der Nomenclatur der Acari. By A. C. Oudemans [34] 126: 20-24. **Revision einiger** Thomsonschen typen der gattung Calliceras (Proct.). By G. von Szelenyi. [34] 126: 83-89. **Supplement zu** C. D. Sherborns Index Animalium. By F. Poche. [Fest. 60 Geburts. Prof. E. Strand] 5: 477-615.

ENTOMOLOGICAL NEWS

Vol. L. OCTOBER, 1939 No. 8

Subspecific Names and the Use of the Term interligata by the late Canon Cabeau.

Editor, Entomological News:

I have read in your esteemed journal what Mr. Hovanitz has published on the interpretation of the term subspecies (Feb., 1938) as well as the communication by Mr. Riley on the same subject (Feb., 1939), especially on the denomination "interligata" which the late Canon Cabeau employed to designate an aberrant character found in a goodly number of *Argynnis* and of *Melitaea*.

I permit myself to bring forward a contribution to this question which, I believe, will furnish the proof of the correctness of Mr. Riley's opinion.

In the Revue Mensuelle Sociéte Entomologique Namuroise, 1919, page 49, Canon Cabeau described for the first time this character *interligata* observed in *Argynnis selene* Schiff. Following is a copy of this description: "Anticis insuper alis secus limbum medium maculae nigrae ambae per lineam nigram ligantur. Au recto des ailes antérieures, les deux taches noires au-dessus de la partie mediane du bord interne sont réunies par un trait noir."

At the end of this description the author adds that he has observed this aberrant character equally in *Argynnis euphrosyne* L. and in *A. lathonia* L.

In the same *Revue*, 1922, page 18, this aberrant *interligata* character is mentioned as existing in *A. dia* L. and on page 46 in *A. ino* Rott. and in *A. pales* Schiff. var. *arsilache* Esper, Finally the same indication is furnished in *Lambillionea*, 1932, page 201, for *A. aphirape* Hb.

Not wishing to encumber the literature with a multitude of diverse names, Canon Cabeau has simply repeated the same very characteristic word to designate the same aberrant character in species of the *Argynnis* and *Melitaea* group.

But Canon Cabeau has not been the only one to notice this aberrant character. Vorbrodt (Schmett. Schweiz. 2. p. 611. figure Bull. Soc. Lepid. Geneve. vol. IV. fasc. 3 and 4, pl. 6, no. 3) had pointed it out before him in *A. pales* Schiff. var. *arsilache* Esp., terming it ab. *guedati*. I ought to add that in var. *arsilache* Esp. this ligature can be considered as constituting a second normal form of the type: more than 50 percent of the spceimens show this character.

Tutt (Ent. Rec. XXI, p. 225, 1909) had also pointed it out in *A. lathonia* L., terming it ab. *j-nigrum*, and Culot (Soc. Lepid. Geneve, Vol. I, p. 69) had in his turn remarked it in *A. amathusia* Esp. under the name of ab. *tramelana*.

If Canon Cabeau had followed these three authors, Vorbrodt, Tutt and Culot, in employing each time a different name even without any indicative meaning as Vorbrodt, Tutt and Culot have done, Mr. Hovanitz's remark would, doubtless, never have seen the light; he would have understood that is was a question of aberrations and not of subspecies.

[Translated]

F. Derenne-Meyers, Editor of the Revue d'Entomologie Lambillionea.

[Mr. Derenne-Meyers enclosed with his letter a photographic copy of a plate accompanying an illustrated supplement to No. 2 of Lambillionea for 1931, showing in figures 1 and 2 this aberrant *interligata* character in *Argynnis ino* Rott. and *A. dia* L. Figure 3 shows it in *A. lathonia* L. under the name ab. *j-nigrum* Tutt. We regret that we are unable to reproduce this plate in the News.—Editor.]

Death of Professor Karny.

Prof. Dr. Heinrich Karny, distinguished student of the Orthoptera and Thysanoptera, died at Graz, Austria, August 7, 1939. Dr. Karny was privatdozent at the University of Graz, and author of *Biologie der Wasserinsekten*, a text and reference book of 320 pages, with 160 text-figures, published by Fritz Wagner at Vienna in 1933.

Notes on Oeneis katahdin and semidea with Designation of Types (Lepid.: Satyridae).

By Richard M. Fox, Academy of Natural Sciences of Philadelphia.

In discussing *O. katahdin,* Mr. H. H. Newcomb did not designate a type specimen, but says in his first notice[1] "Described from a number of specimens taken by the writer on Mt. Katahdin. A detailed description and account of the species will appear in the October News." From the "detailed description and account" [2] the following quotations are pertinent:

"*Hab.* — Mt. Katahdin, Maine, at an elevation of 4250 to 5000 ft. above sea level. Described from forty-three males and twenty females taken by the writer at the above locality in the latter part of June of this year."

"I did not realize that I had discovered a new species . . . it was not until I had submitted specimens to Dr. Skinner and other entomologists that I felt sure that I had been so fortunate."

"I wish to thank . . . Dr. Henry Skinner for his kindness in helping me to determine that I had a new species in *Chionobas katahdin.*"

These statements by Newcomb led me to compare the series of *katahdin* in the collection of the Academy of Natural Sciences of Philadelphia with the excellent plate accompanying the "detailed description," and to check the dates of capture. Newcomb records that on June 28, 1901, he captured eleven specimens, on June 29, forty nine and on June 30, three. These are the sixty-three examples upon which the description was based.

Four specimens in the A. N. S. P. series bear the data "Mt. Katahdin, Me., June 29, 1901, collected by H. H. Newcomb," of these, two were figured by the author of the species [2] and are the originals of the two ventral surface views. One is a male (lower left corner of Newcomb's plate) and it is hereby designated lectotype of *katahdin* Newcomb, catalogued

[1] Newcomb, Ent. News. xii, p. 206 (1901).
[2] id., ibid, pp. 225-231, pl. viii (1901).

as type number 7783 A. N. S. P. As a consequence, the other sixty-two specimens of Newcomb's series collected in 1901 all become paratypes and may be so labelled by the various institutions having them.

In his description of the now famous Mt. Washington, New Hampshire, *semidea*,[3] Thomas Say remarked "Mr. Charles Pickering of Salem has recently presented me with an individual in an excellent state, from which the accompanying plate had been taken." The "accompanying plate," plate 50, was drawn by T. R. Peale.

Box 1A of the Peale collection, in the Academy of Natural Sciences of Philadelphia, contains sixteen specimens listed in Peale's handwriting as "Collected by T. R. Peale in the vicinity of Philadelphia." The statement is probably true of all the specimens except number twelve, which is *semidea*. In Dr. Henry Skinner's hand appears the note "No. 12 is Say's type of *Chinobas semidea*." This specimen exhibits remarkable similarity to the Peale drawing. Undoubtedly it was one of the two specimens before Say when he described *semidea*, specifically the one to which reference is made in the above quotation. Apparently it had been turned over to Peale so that the drawing could be made, after which Peale retained the specimen.

Of the Peale drawing, Scudder remarked[4]. "In this figure the secondaries are represented broader than in Nature, and in the coloring it is not very accurate; the upper surface is not dark enough, and should not have the nervures so reddish as given there; the under surface of the secondaries never has so marked an infusion of ochraceous colors in the outer half, and when it is at all conspicuously present, it also exhibits it somewhat on the basal half; the character also of the markings on the basal half is an unusual one, not representing the norm."

A check on measurements reveals that the Peale specimen exactly agrees with the drawing of the dorsal surface in Say; however the drawing of the ventral surface is disproportionate.

[3] Say, Am. Ent., iii, pl. 50 (1828).
[4] Scudder, Proc. Ent. Soc. Phila., v, p. 23 (1865).

This may have been what Scudder meant by "broader than nature." As to color, the agreement between the drawing and the Peale specimen is remarkable in that the markings are, as Scudder pointed out, "unusual . . . not representing the norm." Particularly the reddish cast of the veins actually exists in the Peale specimen, as does the ochraceous infusion of the distal half of the secondaries ventrally, as contrasted to the lack of ochre basally.

This evidence leads me to designate as lectotype of *semidea* Say the specimen in the Peale collection. It is catalogued, accordingly as A. N. S. P. type number 7000.

In July, 1937, I was one of a party of four which spent several days on the Alpine Meadows of Mt. Washington in search of *semidea*. Throughout the 17th and during the morning of the 18th the weather had been wet and cold. Mrs. Fox accidently had found one specimen clinging in a crevice between two boulders, and a search under rocks revealed several other examples. At one thirty that afternoon the clouds dissipated and the Gardens promptly swarmed with *semidea;* they sprang up from the crevices like nothing else than popcorn in a pan. During the next half hour, without leaving a quarter acre tract on Bigelow's lawn, the three of us netted one hundred and forty-nine specimens. Mr. Ted Fowler, one of our party, caught four of the butterflies with one sweep of his net. At the end of thirty minutes we ceased collecting, but the whole of the Alpine Gardens was alive with *semidea,* and the flash of sun on wings could be seen for some distance.

The series collected during that brief interval is before me, arranged according to intensity of color. Only eighteen specmens agree with the type; six specimens are darker, of which three, all females, are the aberration *nigra* Edwards. The remaining examples are all lighter than the type, the extreme specimens having the outer half of the hind wing ventrally only very slightly mottled with dark color. There were captured in all eighty-nine males and sixty females. In this series the females tend to be darker than the males, while light specimens tend to be larger than dark specimens, sex for sex; that

is, dark females are slightly smaller than light females, and so with males. Variation in size is very slight, however, not more than two millimeters in any dimension.

Comachara cadburyi, A New Genus and New Species (Lepidoptera, Phalaenidae, Sarrothripinae).

By J. G. FRANCLEMONT, Ithaca, New York.

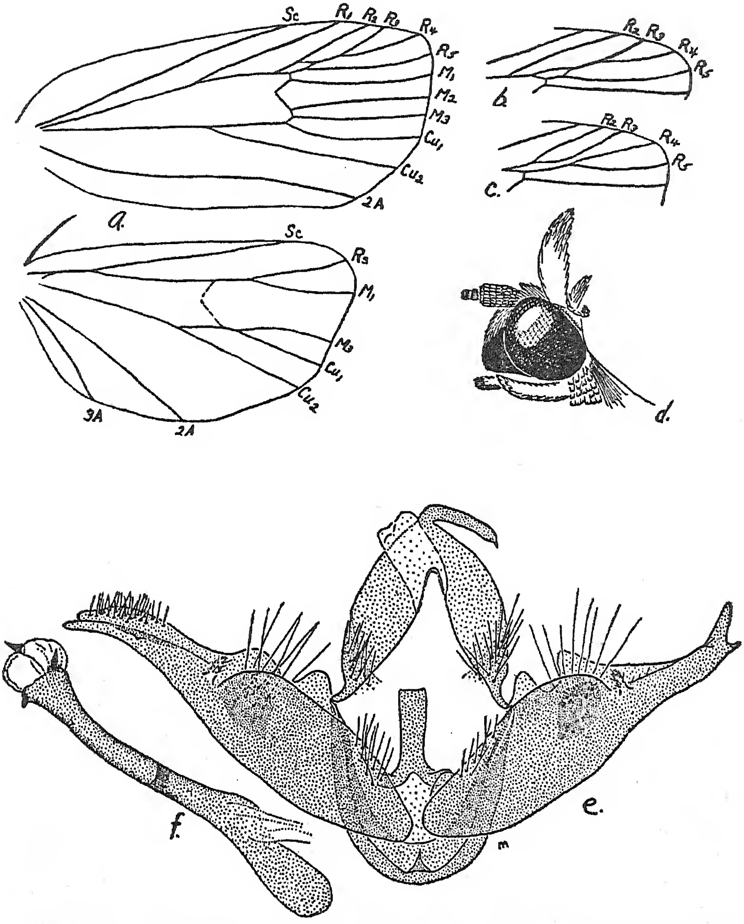
COMACHARA new genus.

Proboscis moderate; palpi moderate and porrect, not exceeding the front, clothed with scales; eyes large and round; antennae of both sexes simple; vertex and front, which is swollen and rounded out, clothed with flat scales. Thorax clothed with large flat scales; legs clothed with short hair-like scales. Abdomen without tufts, clothed with flat scales and some hair. Fore wing moderately long and narrow, highly arched near base, the costal and inner margins almost parallel, the apex rounded, the outer margin evenly curved; R_2 from accessory cell, R_3 and R_4 stalked from accessory cell, R_5 from accessory cell, M_1 from upper angle of discal cell, M_2, M_3 and Cu_1 from lower angle of discal cell; hind wing with Rs and M_1 stalked from upper angle of discal cell, M_3 and Cu_1 stalked from lower angle of discal cell, M_2 obsolete.

Genotype: *Comachara cadburyi* n. sp.

Comachara cadburyi n. sp.

Head, thorax and fore wings silver gray overcast with brownish black; fore wing with the basal area to the antemedial line pale, median and marginal areas darker with the median the darkest, basal line indistinct, black, angled outwardly on Cu, antemedial line vague, double, black, outwardly curved to Cu then inwardly curved to 2A, then outwardly curved to inner margin; postmedial line irregular, double the inner part dark the outer pale, angled outwardly from outer third of costa to $R_3 + R_4$, then curved in and out to M_3, then incurved to inner margin; subterminal line indicated by a series of black dots increasing in size towards inner margin, reniform and orbicular obsolete, a black dot is generally present at the end of the discal cell; hind wing glistening gray. Underside of wings gray, the hind wing lighter and crossed by a vague, irregular, darkish median shade.



Comachara cadburyi n. sp. *a.* Normal venation of fore and hind wings. *b.* & *c.* Variation in the radial system of the fore wings. *d.* Head showing the short palpi and bulging front. *e.* Genitalia of male holotype. *f.* Aedoeagus of same.

Genitalia: Tegumen broad, the uncus moderate and tapering towards tip; vinculum moderate; the valves somewhat assymetrical especially at the distal ends, sacculus large with a prominent thickening in the middle towards the end, clasper reduced to a short prominence; aedoeagus long and slender with a stout spine on the apical end, vesica with two moderate cornuti.

Holotype.—♂ Homebrook, Lower Merion Township, PENNSYLVANIA, June 3, 1920, [in Coll. U. S. N. M.]. *Allotype.*—♀, U. S. Route 1 and St. Mary's River, Boulogne, FLORIDA, April 1, 1936 (J. G. Franclemont), [in Coll. Franclemont]. *Paratypes.*—1 ♂, Philadelphia, PENNSYLVANIA, May 23 (Haimbach); 1 ♂, Lakehurst, NEW JERSEY, May 20 (O. Buchholz), [in Coll. U. S. N. M.]. 1 ♀, same data as Allotype. [in Coll. Cornell Univ.]. 6 ♂ ♂ 2 ♀ ♀, Nantucket, MASSACHUSETTS, June (C. P. Kimball) [in Coll. Kimball and Franclemont].

This genus may be distinguished from all other North American Sarrothripine genera by its shorter and porrect palpi; it likewise differs from *Characoma* in that Rs and M_1 of the hind wing are stalked for one-third their distance from cell to margin; it also differs from the other three genera, *Sarrothripus, Casandria* and *Baileya* by the loss of M_2 from the hind wing. The differences given for the genus will serve to differentiate the species.

This species is named for my very obliging friend, Mr. John W. Cadbury, III, who was my companion on the trip to Florida when the species was first taken by the author, who mistook it for a Tortricid.

I wish to thank Mr. J. F. Gates Clarke of the United States National Museum for the loan of the material of this species in that institution. I also want to express my sincere thanks to Dr. May K. Gyger for making the drawings.

The synonymy of Isosargus (Diptera, Stratiomyidae).

In establishing the generic name *Isosargus* for *Chrysonotus nigricornis* Loew and three related Nearctic species (Canad. Ent., LXVII, p. 273, 1935), I overlooked the Old World genus *Cephalochrysa* established by Kertész (Trans. Linn. Soc., London, XV, p. 99, 1912) for *Sargus hovas* Bigot, from Madagascar. A comparison of the genotypes indicate that the two are synonymous. *Cephalochrysa* must, of course take priority.

The name "*Chrysochroma atriventris* Loew" given by Graenicher (Bull. Wis. Nat. Hist. Soc., X, p. 176, 1913) is evidently an error for *C. nigricornis* Loew. MAURICE T. JAMES.

A Preliminary Study of the Superfamily Papilionoidea in the Northern Portion of Pine County, Minnesota. (Lepidoptera).

By G. N. RYSGAARD, Museum of Natural History,
University of Minnesota.

(Continued from page 196.)

The records of 1937 and 1938 on periodicity of abundance and scarcity of the more common species indicate that *Papilio glaucus turnus* is single-brooded in this region as are many of the others here shown. *Pieris protodice* is found in two forms, *protodice* and *vernalis*. The latter form is that which appears early in the spring, emerging from over-wintering chrysalids. This form, in turn, gives rise to the form *protodice* which occurs later in the season in greater numbers. *Pieris rapae* is double-brooded, but the broods over-lap and the species is found commonly throughout the entire season. *Phyciodes tharos* sp. is two-brooded as are *Basilarchia arthemis, Basilarchia archippus, Nymphalis milberti,* and *Nymphalis antiopa.*

Junonia coenia is many-brooded in the South, but in Minnesota it is undoubtedly single-brooded. There are indications of two broods; the first of these is likely composed of southern migrants as they appear in tattered condition. The specimens appearing in late August are large and perfect.

As the author was not in the study area the entire faunal season, it seems useless to mention here first and last dates of observance. For date records, the dates of collection for the specimens in my private collection will serve, and they may be found in the annotated list. Preceding the names in the list are the check list numbers.

Notice of Possible Suspension of the Rules of Nomenclature in Certain Cases (A. (n. s.) 1).

In accordance with a Resolution adopted by the International Zoological Congress at their Ninth Meeting held at Monaco in 1913, prescribing that not less than one year's notice is to be given by the International Commission on Zoological Nomen-

clature of all applications received for the "Suspension of the Rules," the attention of the zoological profession is hereby invited to the fact that requests for the "Suspension of the Rules" have been received by the Commission in the under-mentioned cases:

(a) ECHINODERMATA.—*Diadema* Humphreys, 1797 (type *Echinometra setosa* Leske, 1778) to be added to the Official List of Generic Names (see Mortensen, 1937, Ann. Mag. Nat. Hist. (10) 19: 463-469) (reference Z. N. (S.) 52).

(b) INSECTA, Neuroptera.—To be added to the Official List of Generic Names with types as shown in brackets:—*Hemerobius* Linnaeus, 1758 (*Hemerobius humulinus* Linnaeus, 1758); *Chrysopa* Leach, 1815 (*Hemerobius perla* Linnaeus, 1758) (see Cowley and others, 1937, Generic Names of British Insects, Pt. 4) (reference Z. N. (S.) 42).

(c) INSECTA, Lepidoptera.—To be added to the Official List of Generic Names with the type as shown in brackets:—*Actinote* Hübner, 1819 (*Papilio thalia* Linnaeus, 1758) (see Hemming, 1936, Proc. R. Ent. Soc., Lond. (B) 5:56-57) (reference Z. N. (S.) 63).

(d) REPTILIA.—*Bitis* Gray, 1842 (type *Vipera* (*Echidna*) *arietans* B. Merrem, 1820) to be added to the Official List of Generic Names, and *Cobra* Laurent, 1768, to be suppressed (Stejneger, 1936, Copeia, 3:140) (reference Z. N. (S.) 121).

2. In adopting the Resolution referred to above, the International Zoological Congress expressly stated that their object was thereby to render it possible for zoologists, particularly specialists in the group in question, to present to the Commission arguments for or against the suspension of the rules proposed. Any such representations should be furnished to the Secretariat to the Commission (British Museum (Natural History), Cromwell Road, London, S. W. 7) as soon as possible and in any case within one year of this day's date. Every such communication should be clearly marked with the Commission's reference number as given above.

By Order of the Commission.
(Signed) FRANCIS HEMMING,
Secretary to the Commission.

Secretariat of the Commission,
British Museum (Natural History),
Cromwell Road, London, S. W. 7.
27th June, 1939.

On Two Species of Neotiphia from Arizona (Hymenoptera: Tiphiidae).

By V. S. L. PATE, Cornell University.

In the Hymenoptera collected by Messrs. James A. G. Rehn, John W. H. Rehn and myself in the summer of 1937, in the southwestern United States, is a series of specimens of the interesting genus *Neotiphia.* A study of this material indicates that there are two new species represented in the lot. Specimens of *Neotiphia* are apparently relatively rare in collections and the species of this genus hitherto described have been recorded originally as a rule from unique specimens or from but one sex. It is interesting, therefore, that the two forms described below are known from both sexes and that one, *Neotiphia pima,* is represented by a short series.

The terminology of Allen and Jaynes[1] has been employed in the main in the following descriptions.

Neotiphia chiricahua[2] new species.

The present distinctive species is most closely related to *Neotiphia sulcata* (Roberts) from which it may be differentiated by the larger size, the tawny wings, the tegulae which are margined only along the posterior edge, the non-sulcate labium, the parallel-sided median areole of the dorsal face of the propodeum and the differently sculptured lateral faces of the median segment. The sixth abdominal sternite of the males of this species is of the same general distinctive shape as that of *sulcata* but, in addition to the lateral carinae, *chiricahua* has a strong median longitudinal carina extending from the base to the apex. The females of *chiricahua* have a minute and indefinite stigma in the fore wings in sharp contrast to the large and definite one possessed by *sulcata.*

Type.— ♂ ; Two miles southwest of Chiricahua, San Bernardino Valley, Cochise County, ARIZONA. Elevation, 4650 feet. August 27, 1937. (Rehn, Pate and Rehn; at flowers of a white mustard.) [Academy of Natural Sciences of Philadelphia, Type no. 4198.]

---

[1] Proc. U. S. Nat. Mus., LXXVI, Art. 17, (1930).
[2] After the Chiricahua Indians of southeastern Arizona.

♂.—13 mm. long. Black; mandibles very dark red; tarsal segments dark fulvous apically. Wings clear light fulvous; stigma and subcosta dark brunneous, remaining veins fulvous.

Head suborbicular in anterior aspect, subfulgid; front clothed with long reclinate silvery pubescence, with fine separated acupuncturation upon which is superposed a series of coarse punctures of first to second degree of density, immediately in front of median ocellus with a nitidous glabrous region whose area is about the size of the ocellus. Vertex laterad of hind ocelli nitidous halfway to dorsal margin of the compound eye, otherwise covered with punctures of the second degree of density; ocellocular line about one and one-half times the length of the postocellar line. Temples with a fine acupuncturation upon which is superposed a series of larger punctures of the second degree of density. Antennocular line five sixteenths the length of the compound eye. Clypeus coarsely semiconfluently punctate, length medially three-eighths that of eye, produced medially into a broad arcuate lobe, the disc of which is tumid and the apical margin furnished with a wide deflexed glabrous nitidous semilunate bevel, without a medio-apical rostrate extension or acute point. Labium not longitudinally sulcate. Mandibles punctate basally; median longitudinal groove present.

Thorax fulgid dorsally, subopaque on pleura and sterna. Pronotum, save for a broad arcuate nitidous band posteriorly, with fine moderately close acupuncturation upon which is superposed an irregular series of large coarser punctures of the first to second degree density; anterior dorsal margin with a strong transverse carinula; lateral faces nitidous to microscopically clathrately aciculate above and with fine oblique rugulae below; transverse groove absent. Mesonotum almost devoid of acupuncturation but rather uniformily covered with larger, coarser punctures of the third degree of density. Scutellum with irregular close marginal punctures and with a discal patch of large close punctures; no acupuncturation. Postscutellum with fine acupuncturation and larger punctures of second to third degree of density. Tegulae about as long as wide, margined along posterior edge only. Mesopleura and sternum anteriorly with a strong epicnemium, covered with fine acupuncturation upon which is superposed a series of moderately close larger punctures. Propodeum fulgid; dorsal face with median areole rectangular, one and one-third times as long as broad, the lateral carinae parallel, bisected on basal half by a low carinula, the surface within areole inconspicuously and finely

irregularly rugulate, laterad of lateral carinae half way to lateral margin the surface is subfulgid, obliquely aciculate and microscopically punctate, the posterior margin furnished with a strong transverse carina which at the dorsolateral angles breaks up abruptly into a small fan of oblique rugulae; posterior face subfulgid, finely microscopically punctate discally, becoming finely and irregularly rugulate marginally, without a median longitudinal carinula, the lateral margins strongly carinate; lateral faces perfulgid, glabrous, dorsal and posterior half strongly horizontally lineate, the lower anterior half with a horizontal subrectangular area with horizontal arcuate striae abruptly marked off from remainder of surface. Hind tibiae with the sensorium elongate-cuneate and distinctly impressed. Hind metatarsi with a single row of five short stout spines above.

Abdomen fulgid, without acupuncturation. First five tergites with large punctures of the second to third degree density; penult tergite with larger, coarser and very close punctures; ultimate tergite with coarse, subconfluent, rugulose punctuation. First two tergites with short, sparse, decumbent, subaeneous pubescence becoming progressively longer, more abundant and reclinate to suberect on each succeeding tergite. First sternite subfulgid, with a strong high transverse angulate carina separating the flat escutcheon from the disc which on its anterior half is furnished with a strong high median longitudinal carina emanating from the angle of the anterior transverse carina, and whose surface is largely rugulose. Second to fifth sternites with fine acupuncturation superposed on which is a coarser puncturation largely of the second degree of density; clothed with a sparse pubescence similar in general to that of first two tergites and apically with transverse marginal fimbriae. Sixth sternite concave medially at base; lateral carinae distinct on apical half, median carina present and well developed from base to apex and separated from the lateral carinae by a single row of small punctures; medioapically the sternite is produced into a subrectangular lobe which is emarginate apically and separated laterally on each side from remainder of segment by a deep rounded notch.

Allotype.—♀; Topotypical; same data as type. [Academy of Natural Sciences of Philadelphia.]

♀.—14 mm. long. Similar to male except as follows:

Head perfulgid; practically devoid of acupuncturation, the larger puncturation coarser, more scattered, with large nitidous

intervals and in general with a tendency toward third degree of density. Ocellocular line about one and one-half times the length of the postocellar line. Scapes with a loose pencil of long sordid light aeneous hairs apically.

Thorax with the mesonotum in general more sparsely punctate than the male. Tegulae as broad as long, much more weakly margined along the hind edge than in the males. Propodeum with the dorsal and posterior faces more delicately sculptured than in male; the median areole of dorsal face without a median carinula and the surface not finely rugulose within; posterior face without a median longitudinal carinula; lateral faces as in male. Hind tibia with the sensorium elongate-cuneate and moderately impressed. Hind metatarsi with the longitudinal groove linear, elongate, deeply impressed, and with a double row of four short stout spines above. Fore wing with the stigma minute, indefinite, inconspicuous, extending less than one-half the distance from the origin of the radial vein at its apex to the basal vein.

Abdomen with puncturation and pubescence essentially the same as in male. Last tergite very coarsely and rugosely striatopunctate on basal three-fourths and well clothed with long suberect light hairs, the punctate portion not abruptly elevated above the impunctate apical coriaceous portion. First sternite with the transverse carina separating the escutcheon from the disc not as strong nor as conspicuous as in male, the median longitudinal carina on basal half of disc wanting or very inconspicuous, the disc covered with fine, well separated acupuncturation. Sixth sternite with the apical three-fourths of the sides of its median impunctate shagreened triangle straight and inclined at much more than 45° to the median line.

Remarks.—Despite certain disparities, as noted in the above description of the female, I believe the two specimens I have before me represent merely the opposite sexes of the same species inasmuch as they were taken together, although not as I recall in copula.

(To be continued.)

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( )follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—**Anon**—El mas feroz y sanguinario de los insectos. [El Agric. Venezolano] 4: 91-93, ill. **Bruce, W. G.**—Some observations on insect edaphology. [103] 12: 91-93. **Brues, C. T.**—Some adaptive responses of taxonomy to a changing environment. [6] 47: 145-154. **Daviault, L.**—Notes sur l'action des parasites de la chenille a tente du cerisier: Cacoecia cerasivorana. [Le Natur. Canadien] 66: 179-187, ill. **Flanders, S. E.**—The role of arrhenotoky in the adaptation of insects [68] 90: 82. **Gemignani, E. V.**—La Seccion Entomologica del Museo Argentino de Ciencias Naturales. [VII Internat. Congr. Ent. pp. 133-143. **Glick, P. A.**—The distribution of insects, spiders and mites in the air. [U. S. Dept. Agr. Tech. Bull.] no. 673; 150 pp., ill. **Kellogg, V. L.**—Biographical Memoir. By C. E. McClung. [Biogr. Mem. Nat. Acad. Sci. U. S. A.] 20: 245-257, ill. **Lahille, F.**—Estabilidad, evolucion, adaptacion y progreso. [104] 10: 81-86. **Meyrick, E.**—Obituary. By K. J. Hayward. [104] 10: 87-89. **Petersen, A.**—Keys to the orders of immature stages (exclusive of eggs and pronymphs) of North America insects. [7] 32: 267-278. **Smith, C. C.**—Method of embalming large insects. [68] 90:116. **Vesey-Fitzgerald, D.**—Colour-pattern resemblances between wasps and other insects in Trinidad. [107] A, 14: 103-105. **Wade, J. S.**—A contribution to a bibliography from 1909 to 1936 of Henry David Thoreau. [6] 47: 163-203. **Weiss, H. B.**—Insect food habit ratios of North Carolina, and Mt. Desert Island, Maine [6] 47: 155-157.

ANATOMY, PHYSIOLOGY, ETC.—**Ancona, H. L.**—Histologia de la glandula venenosa de Crypsidronus breyerii (Arachnida). [An. Escu. Nac. Cien. Biol., Mexico City] 1: 107-118, ill. **Banks, C. J.**—Cephalic glands in the Corixidae. [107] 14: 83-85, ill. **Becker & Plagge.**—Uber das

die Pupariumbildung ausloesende Hormon der Fliegen. [97] 59: 326-341, ill. **Boving & Henriksen.**—The developmental stages of the Danish Hydrophilidae. [Vidensk. Medd. Dansk Nat. Hist. Forening] 102: 27-162, ill. **Deane, C.**—Eyes of insects.—Notes on facet dimensions. [Victor. Nat.] 56: 28-31; 42-48, ill. **Dethier, V. G.**—Taste thresholds in lepidopterous larvae. [92] 76: 325-329. Prothoracic glands of adult Lepidoptera. [6] 47: 131-144, ill. **Dobzhansky & Sokoloff.**—Estructura y varacion de los cromosomas en Drosophila aztecta. [An. Escu. Nac. Cien. Biol., Mexico City] 1: 37-66, ill. **Ehlers, M.**—Untersuchungen ueber Formen aktiver Lokomotion bei Spinnen. [89] Abt. Syst. 72: 373-499, ill. **Gäbler, H.**—Häufigkeit der farbvarietäten der nonne (Lymantria monacha). [94] (A) 152: 1-11, ill. **Gerould, J. H.**—Structure and action of the heart of Bombyx mori and other insects. [Acta Zool.] 19: 297-352, ill. **Graham, J. F.**—The external features of the early stages of Spathiophora hydromyzina (Dipt., Cordy-luridae). [107] B, 8: 157-162, ill. **Hackbart, W.**—Der einfluss Kurz fristig Wirkender Temperaturen auf die Entwicklung und Fortpflanzung von Schadinsekten. [46] 35: 468-534, ill. **Hagan, H. R.**—Diploptera dytiscoides, a viviparous roach with elongate pleuropodia. [7] 32: 264-266, ill. **Hilton, W. A.**—Nervous system and sense organs, LXXVIII: Homoptera. [13] 31: 36-38, ill. LXXIX: Hemiptera. [13] 31: 39-41, ill. **Kato, Mutsuo.**—The diurnal rhythm of temperature in the mound of an ant, Formica truncorum var. yessensis, widely distributed at Mt. Hakkoda. [Sci. Repts. Tohoku Imp. Univ.] 14: 52-64, ill. Body temperatures of the strawberry weevil, Anthonomus bisignifer, and its limiting factors. [Sci. Repts. Tohoku Imp. Univ.] 14: 11-19, ill. **Koonz, C. H.**—Spermatogenesis of a haploid parthenogenetic Hymenopteron, Spilocryptus extrematus. [Trans. Amer. Micros. Soc.] 58: 292-303, ill. **Levereault, P.**—The morphology of the Carolina mantis (Orth.). [Univ. Kansas Sci. Bull.] 25: 577-634, ill. **Mellanby, K.**—The function of insect blood. [Biological Reviews, Cambridge] 14: 243-260. **Nielsen, E. T.**—Temperatures in a nest of Bombus hypnorum. [Vidensk. Medd. Dansk Nat. Hist. Forening] 102: 1-6, ill. **Piepho, H.**—Uber den Determinationzustand der Vorpuppenhypodermis bei der Wachsmotte, Galleria mellonella. [97] 59: 314-326, ill. **Seamans & Woodruff.**—Some factors influencing the number of molts of the german roach. [103] 12: 73-76. **Smith, H. W.**—The blood of the

cockroach (Periplaneta americana). Cell structure, degeneration and cell counts. [New Hamp. Exp. Sta. Tech. Bull.] no. 71, 23 pp., ill. **Stiles, K. A.**—The time of embryonic determination of sensoria and antennal color and their relation to the determination of wings, ocelli and wing muscle in aphids. [92] 76: 442-447, ill. **Varela, G.**—El cloruro de calcio en la intoxicacion por la toxina del alacran de Guerrero (Centruroides limpidus). [An. Escu, Nac. Cienc. Biol., Mexico City] 1: 133-134. **Varela & Sanchez Posada.**—Anaponzonas del veneno del alacran de Guerrero (Centruroides limpidus) [An. Escu. Nac. Cienc. Biol., Mexico City] 1: 135-137. **Varley, G. C.**—Unusual methods of stridulation in a cicada (Clidophelps distanti) and a grasshopper (Oedaleonotus fuscipes) in California. [107] A, 14: 97-100, ill.

ARACHNIDA AND MYRIOPODA.—Chamberlin, R. V.—A new arachnid of the order Pedipalpida. [95] 52: 123-124, ill. **Chamberlin & Ivie.**—New tarantulas from the southwestern states. [Bull. Univ. Utah] Biol. Ser. 5: 17 pp., ill. **da Fonseca, F.**—Notas de Acaralogia, XXV: Os Laelaptidae gigantes, parasitas de roedores Sul Americanos; generos e especies novos. [73] 12: 8-102, ill. (S*). XXVI: Novos estudos sobre o genero Laelaps. 12: 103-145, ill. (S*). XXVII: Liponissus brasiliensis sp. n., parasita habitual de roedores e acidental do homen. 12: 147-160, ill. XXVIII: Ocorrencia de Dermanyssus gallinae no Brasil (Dermanyssid.). 12: 161-163. **Gertsch & Mulaik.**—Report on a new Ricinuleid from Texas. [40] no. 1037, 5 pp., ill. **Hilton, W. A.**—A preliminary list of pycnogonids from the shores of California. [13] 31: 27-35, (*). **Jacot, A. P.**—New mites from western North Carolina. [Jour. E. Mitchell Sci. Soc.] 55: 197-202, ill. **Mello-Leitao, C. de.**—Algumas Aranhas de S. Paulo e Santa Catarina. [73] 12: 523-531, ill. (S*). Some new Argiopid spiders from British Guiana taken by Mr. O. W. Richards from the nests of fossorial wasps. [15] 11: 105-112, (S*).

THE SMALLER ORDER OF INSECTS—Andre F.—A synopsis of the American spp. of Chirothrips (Thysanoptera). [10] 41: 192-204, ill. (k*). **Bailey, S. F.**—The Mullein thrips. [55] 15: 111-116, ill. (k). **Bueker, E. D.**—Springtails (Collembola) of the St. Louis area. [Trans. Acad. Sci. St. Louis] 30: 30 pp., ill. (*). **Carpenter, F. M.**

—Records and notes of Nearctic Mecoptera and Raphidiodea. [19] 34: 162-166, ill. **Hemming, F.**—Neuroptera. [See under Special]. **Kennedy, C. H.**—The female of Aeshna biliosa (Odonata). [7] 32: 344-348, ill., (S). **Mills, H. B.**—Remarks on the geographical distribution of North American Collembola. [19] 34: 158-161. **Thompson, G. B.**—The Piaget Collection of Mallophaga. Part VII. [75] 4: 139-144, cont. **Wagner, K.**—Bemerkungen uber die Fam. Malacopsyllidae und Beschreibung der neuen arten (Siphonaptera). [Zeit. Parasitenk.] 11: 58-67, ill. (S*). **Wilson, F. H.**—The life-cycle and bionomics of Lipeurus caponis (Mallophaga). [7] 32: 318-320. **Wright, M.**—Argia fumipennis in Ohio. [43] 39: 155-156.

ORTHOPTERA.—Burr, M.—Modern work on earwigs. [Science Progress, London] 34: 20-30. **Bruch, C.**—Algunas observaciones biologicas sobre Schistocerca infumata (Acrid.). [Rev. Mus. La Plata] 1 (Zool.): 209-216, ill. **Daguerre, J. B.**—Nuestros actuales conocimientos sobre la langosta. [104] 10: 65-69. **Hagan, H. R.**—See under Anatomy. **Hebard, M.**—Studies in Orthoptera which occur in North America north of the Mexican boundary. [1] 65: 161-191, ill. **Liebermann, J.**—El genero "Spathalium," en la region neotropical con la descripcion de una nueva especie Argentina. [104] 10. 47-54. **McNally, A. G.**—Notes on the appearance of the European earwig in Ontario. [4] 71: 116-117. **Princis, K.**—A case of reduction of the right tegmen in a male of Syrbula admirabilis. [39] 22: 49-51, ill. **Rehn, J. A. G.**—A n. gen. and four n. spp. of Acrididae from Brazil and Argentina. [1] 65: 193-208, ill. **Tinkham, E. R.**—Five new records and notes on Canadian Acrididae from the Higdon ranch, southeastern Alberta. [4] 71: 121-126. **Varley, G. C.**—Frightening attitudes and floral simulation in praying mantids. [107] A, 14: 91-96, ill. See under Anatomy. **Werner, F. G.**—A report on the earwig Doru aculeatum aculeatum, from a marsh in northern Illinois. [Trans. Ill. State Acad. Sci.] 31: 249.

HEMIPTERA.—Barber, H. G.—Insects of Porto Rico and the Virgin Islands.—Hemiptera Heteroptera (except Miridae & Corixidae). [Sci. Surv. P. R., N. Y. Acad. Sci.] 14, pt 3: 263-441, ill., (k*). A n. sp. of Heterogaster from the southern part of the U. S. (Lygaeid.). [10] 41: 173-174. **Beamer, R. H.**—The gen. Calana (Cicadell.). [103] 12: 81-82, (*). **de Carlo, J. A.**—Dos nuevas especies del genero

Abedus. Nuevas consideraciones sobre Belostoma costalimai y Lethocerus truncatus. [104] 10: 41-45, ill. **Doering, K. E.**—Contribution to the taxonomy of the subf. Issinae in America north of Mexico (Fulgorid). [Univ. Kansas Sci. Bull.] 25: 447-556, ill. (k). **Essig, E. O.**—A new Aphid of the gen. Mindarus from white fir in British Columbia. [55] 15: 105-110, ill. **Evans, J. W.**—The morphology of the thorax of the Peloridiidae. [107] 8: 143-150, ill. **Gronovsky, A. A.**—Three n. spp. of Aphiidae. [10] 41: 143-154, ill. **Hungerford, H. B.**—Two new Corixidae from Bolivia. [103] 12: 97-99, ill. **Knight, H. H.**—Reuteria puton; four new species from the United States (Miridae). [Iowa State Coll. Jour. Sci.] 13: 129-133, ill. **McKenzie, H. L.**—A revision of the genus Chrysomphalus and supplementary notes on the genus Aonidiella (Coccoid., Diaspidid.). [Microent.] 4: 51-77, ill. (*). **DeLong, D. M.**—The Texananus (Cicadellid) spp. of the majestus group with the description of four n. spp. [43] 39: 235-238, (k*). **Patch, E. M.**—Food-plant catalogue of the Aphids of the world, includ. the Phylloxeridae. [Maine Agr. Exp. Sta.] Bull 393, 431 pp. **Sulc, K.**—Description of a new psyllid from Greenland. [75] 4: 78-81, ill. **Tissot, A. N.**—Notes on the Lachinini of Florida with descriptions of two n. spp. (Aphiid.). [39] 22: 33-48, ill. (k*). **Tuthill, L. D.**—New species of Psyllidae from the western United States. [Iowa State Coll. Jour. Sci.] 13: 181-186. **Varley, G. C.**—See under Anatomy. **Wehrle, L. P.**—Observations on three spp. of Triatoma (Reduv.). [19] 34: 145-154, ill. **Wilbur, D. A.**—Mass flights of the Pentatomid, Thyanta custator, in Kansas. [103] 12: 77-80, ill.

LEPIDOPTERA.—Braun, A. F.—Notes and n. spp.: Gracilariidae. [7] 32: 279-287. **Busck, A.**—Un Lepidoptera nuevo que projudica el nispero en la Argentina (Gelechiidae). [106] 127: 361-365, ill. (S*). **Forbes, W. T. M.**—A new Trichotaphe from New York (Gelechiidae). [6] 47: 159-161, ill. **Franclemont, J. G.**—A revision of the American spp. of the gen. Enargia (Phalaenidae, Amphipyrinae). [4] 71: 113-116, ill. (k*). **Gäbler, H.**—See under Anatomy. **Hemming, F.**—See under Special. **McDunnough, J.**—Pterophorid descriptions and notes. [4] 71: 109-112, ill. (*). **Meyrick, E.**—New microlepidoptera, with notes on others. [36] 89: 47-62. (s*). **Watkins, H. T. G.**—A new satyrid butterfly. [75] 4: 160. **Williams & Bell.**—New

species of Pellicia with remarks on the genus (Hesperiid.). [1] 65: 135-159, ill.

DIPTERA.—Andrews, H. W.—The family Cyrtidae. [Pro. & Trans. So. Lond. Ent. & Nat. Hist. Soc.] 1938-39: 76-79, ill. **Dampf, A.**—Un nuevo Phlebotomus (Psychodidae) procedente de Texas. [An. Escu. Nac. Cienc. Biol., Mexico City] 1: 119-131, ill. **Fluke, C. L.**—New Syrphidae from Central and North America. [7] 32: 365-375, ill. **Harmston & Knowlton.**—Three new Dolichopodidae [103] 12: 83-86, ill. New Dolichopodidae. [7] 32: 349-352, ill. **King, Bradley & McNeel.**—The mosquitoes of the southeastern states. [U. S. Dept. Agr. Misc. Publ.] no. 336, 90 pp,. ill. (K). **Knipling, E. F.**—A key for blowfly larvae concerned in wound and cutaneous myasis. [7] 32: 376-383, ill. **Macfie, J. W. S.**—A key to the species of Ceratopogonidae akin to Macropeza. [36] 89: 12 pp., ill (s*). **Sabrosky, C. W.**—The European fruit fly and its forms in North America (Chloropid.). [7] 32: 321-324, (k). **Shewell, G. E.**—A revision of the gen. Camptoprosopella (Lauxaniid.). [4] 71: 130-144; 145-153, ill. (k*). **Stone, A.**—A n. gen. of Trypetidae near Anastrepha. [91] 29: 340-350, (Sk*). **Van Duzee, E. P.**—Note on a Tabanid. [55] 15:116.

COLEOPTERA.—Boving & Henriksen.—See under Anatomy. **Buchanan, L. L.**—The spp. of Pantomorus (Curculionidae) of America north of Mexico. [U. S. Dept. Agr. Misc. Publ.] no. 341, 39 pp., ill. (k*). **Cartwright, O. L.**—Eleven new American Coleoptera (Scarabaeidae & Cicindelidae), [7] 32: 353-364, ill. **Cazier, M. A.**—Notes on the gen. Amblycheila (Cicindel.). [55] 15: 110. **Fisher, W. S.**—A n. sp. of Vrilletta from California (Anobiidae). [10] 41: 174-175. **Hatch, M. H.**—A key to the spp. of Nebria of northwestern North America (Carab.). [55] 15: 117-122. **Hinton, H. E.**—A contribution to the classification of the Limnichidae. [9] 72: 181-186, ill. On some new genera and species of neotropical Dryopoidea. [36] 89: 23-45, ill. **Horn, W.**—Uber korrelations-erscheinungen im Cicindelinen-genus Ctenostoma. [104] 10: 39-40. **Nunberg, M.**—Nuevas especies de Coleopteros del gen. Platypus de Peru. [Bol. Mus. Hist. Nat. "Javier Prado," Lima, Peru] 3: 56-65, ill. (S*). **Pic, M.**—Bruchidae en partie nouveaux de l'Amerique Meridionale. [104] 10: 19-20. **Sanderson, M. W.**—A monographic revision of the North American spp.

of Stenelmis (Dryopid.). [Univ. Kansas Sci. Bull.] 25: 635-720, ill. (k*). **Schedl, K. E.**—Scolytidae und Platypodidae. [104] 10: 21-28, ill. (s*). **Wallis, J. B.**—The gen. Graphoderus in North America north of Mexico (Dytiscid.). [4] 71: 128-130, (k). **Wenzel, R. L.**—A n. gen. and several n. spp. of North American Histeridae. [7] 32: 384-394, ill.

HYMENOPTERA.—**Bohart, R. M.**—Notes on Odynerus with a key to the North American subgenera and description of a new subgenus. [55] 15: 97-104, ill., (k*). **Bugbee, R. E.**—A discussion of the Eurytoma rhois complex with a description of a n. sp. (Chalcidoidea. Eurytomid.) [7] 32: 415-427, ill. **Burks, B. D.**—A n. sp. of Chalcis from the Dominican Republic. [40] no. 1039, 2 pp., ill. **Cockerell, T. D. A.**—New bees from Santa Catalina Island. [13] 31: 25-26. **Donisthorpe, H.**—Descriptions of several spp. of ants taken by O. W. Richards in British Guiana. [107] B, 8: 152-154, (S*). **Grandi, G.**—Nuovi Agaonidi (Chalcidoidea) raccolti nel Brasile dal Prof. F. Silvestri. [Bol. Ist. Ent. R. Univ. Bologna] 10: 44-69, ill. **Kato, Mutsuo.**—See under Anatomy. **Krombein, K. V.**—Descriptions and records of new wasps from New York State (Sphecidae). [19] 34: 135-144, (k*). **Linsley, E. G.**—A revision of the Nearctic Melectinae (Anthophoridae). [7] 32: 429-468, ill. (k*). **Michener, C. D.**—Notes on North American spp. of Megarhyssa (Ichneumon.). [55] 15: 126-131, (k*). A revision of the genus Ashmediella (Megachilidae). [Amer. Midl. Nat.] 22: 1-84, ill. (k*). **Mickel, C. E.**—Monograph of a new Neotropical Mutillid gen., Pappognatha. [7] 32: 329-343, (Sk*). **Muesebeck, C. F. W.**—A new mealybug parasite (Scelion.). [4] 71: 158-160, ill. **Nielsen, E. T.**—See under Anatomy. **Ogloblin, A. A.**—Las especies nuevas o poco conocidas del genero Lymaenon de la Republica Argentina (Mymarid.). [104] 10: 29-37, ill. **Smith, M. R.**—The North American ants of the gen. Harpagoxenus with the description of a n. sp. [10] 41: 165-172, ill. Notes on Leptothorax (Mychothorax) hirticornis, and description of a related n. sp. (Formicidae). [10] 41: 176-180. **Timberlake, P. H.**—N. spp. of bees of the gen. Dufourea from California. [7] 32: 395-414, (k). **Vesey-FitzGerald, D.**—See under General. **Weber, N. A.**—Descriptions of new North American spp. & subspp. of Myrmica (Formicid.). [Lloydia] 2: 144-152.

SPECIAL NOTICES.—Notice of possible suspension of the rules of nomenclature in certain cases (Neuroptera and Lepidoptera). **Hemming, F.**—[107] B, 8: 151. **Katalog der palaearktischen** Tabaniden nebst bestimmungstabellen und zusatzen zu einzelnen arten sowie neubeschreibungen. By O. Krober. [Acta Ins. Mus. Zool. Univ. Atheniensis] 2: 57-245. **Nomenclator** Zoologicus. By S. A. Neave Volume 1. A-C. 1939. 957 pp.

Die Staaten der Ameisen. By Wilhelm Goetsch, Professor in the University of Breslau and Director of the Zoölogical Institute and Museum. vii + 159 pp., 84 figs. Published by Julius Springer. Berlin. 1937. Price, RM 4.80, bound. This small book is primarily intended for the general reader who has at least some biological background. It is especially well adapted for supplementary reading in a course in general entomology, as it gives a well rounded picture of the life of the ant. The book is divided into seventeen major sections which treat: morphology, development, castes, nuptial flights, colony foundation, guests, wars, foraging, nests, care of brood, grain chambers, fungus gardens, aphid attendance, departure from nest and return, recognition, morphology and division of labor, psychic capacities, origin of soldiers, sex determination, evironment and racial inheritance, and seasons and fate. Following these is an appendix which contains a short bibliography and control measures against the ants which cause damage. Besides the usual general material which is found in most books of its type, "Die Staaten der Ameisen" presents a digest of many interesting observations on various species which have been made recently by Dr. Goetsch and published as journal articles. The book is definitely sound in its myrmecological philosophy. There are no teleological explanations or anthropomorphic implications—these are not always absent from general books. Dr. Goetsch has written in a most charming style of which his delightful humor is an integral part. The author reproduces many figures showing the involved trails of ants to and from their nests and when alarmed. Their intricacy and the apparent going around in circles seem to bear out Mark Twain's remark that "die Ameise ist das dümmste Tier." Then Dr. Goetsch reproduces a figure showing a similar roundabout way of getting from one point to another, apparently again bearing out Mark Twain, but he adds, with probably a quiet chuckle, that he is here reproducing a man-made mountain road, as it appears from an airplane. It all depends on the viewpoint, M. T.! As for binding, printing,

illustrations, etc., this little volume is exceptionally well done. The book can well be recommended to the general reader and to the myrecologist alike as it has much in the way of interest for both.—MERLE W. WING.

OF ANTS AND MEN. By CARYL P. HASKINS, Director, Haskins Laboratories; Research Professor, Union College; Research Associate, Harvard University; Research Associate, M. I. T. Prentice-Hall, Inc., New York, 1939. Pp. vii + 244. 15 full-page photographs. Price, $2.75. Interest in ants has been present among men for a long time. It has taken various forms of which the gastronomic, surgical and general economic interest, not to mention others, appear to be outstanding. The most enduring interest in ants, however, is the philosophical one shown by the countless naturalists of all ages. Dr. Haskins is a recent addition to this group. He has observed the social life of ants for a number of years. Out of these observations several journal articles and the present volume have evolved. This book appears to be one of the best of its kind. The author's long acquaintance with living rather than dead ants is perhaps first in importance. Furthermore, Dr. Haskins brings to his readers a thorough knowledge of biology and sociology in the broader sense. The aim of the present volume is to show that perhaps in certain of the superficial parallels between the social life of these insects and that of man there may be a more fundamental significance than is commonly realized. "An attempt is made in this book to point out some of the more obvious of these analogies and to suggest bits of evidence and trends of thought in connection with them." A survey of the chapter headings will give the reader a partial insight into the scope of the work: Earth Dwellers; I. The Dawn; II. The Ants of Today; III. Ants and Men as Individuals; IV. The Rise of the City; V. The Ties That Bind; VI. The Ant Colony as a Multicellular Organism; VII. Fascism or Communism; VIII. War; IX. Slavery; X. The Tributary Peoples; XI. The Fate of the Primitives; XII. In the Future; Epilogue. The chapter headings are not the usual ones, but neither is the book. Its style is unusually lucid and entertaining; its subject matter is stimulating. Throughout the book comparisons between ant and human society abound. These are philosophically sound and do not possess the rancor of anthropomorphism, or serve unjustly as a medium for the airing of personal views. The reader will discover that ant society had almost stopped its evolution over fifty millions of years ago, whereas the society of man is, relatively speaking, in its in-

fancy. Ants and men can be compared in many ways socially, but not to such an extent individually. Due, however, to the difference in the relative ages of the two groups, many social comparisons cannot be made in their entirety (*teste* Chapter IX, Slavery). The last chapter, "In the Future," asks a number of questions that only future workers, with a more complete background, can answer. This chapter serves to show the layman and general reader that our present knowledge of ants is incomplete. The book is attractively bound. The paper is of good quality. There are fifteen full-page original photographs (twelve of which were taken by Dr. D. M. Gallagher, the others by the author). Finally, a well compiled index enhances the value of the book. To all general readers and biologists who wish a different and stimulating book on ants, "Of Ants and Men" is heartily recommended. — MERLE W. WING.

The FULGORIDAE OF OHIO, by HERBERT OSBORN, Ohio State University Studies, Bulletin 35, July 1938. — Dr. Osborn has been giving the students of the Homoptera many helpful treatises on groups of this order, particularly as regards Ohio species. The present one follows the author's usual style; giving keys to the subfamilies, genera and species; generally brief descriptions of the species, with well delineated figures showing the whole insects or their characteristic parts. Several new forms are described. Students of this order will find this bulletin an important addition to their libraries.—E. T. CRESSON, JR.

OUR SHADE TREES, by EPHRAIM PORTER FELT. New York Orange Judd Publishing Co., Inc., 1938, 187 pp., 31 half-tone plates, 1 text figure, $2.00. "The purpose of this book is to outline the relation of trees to suburban life, the needs of shade trees under prevailing conditions, and to advise methods which will permit the owner to offset, in some measure at least, the present day perils or hazards of shade trees." The insect perils, as Dr. Felt sees them, are the gypsy moth, elm leaf beetle, European elm bark beetle, beech scale insect, European spruce sawfly and Japanese beetle. Means of recognizing them are left to other books or sources of information, but their control by spraying, by borer control and by parasites is described in a later chapter.—P. P. CALVERT.

The Principles of Insect Physiology, by V. B. Wigglesworth, London School of Hygiene and Tropical Medicine. 434 pp., 316 illustrations. 1939. London, Methuen and Company. New York, E. P. Dutton and Company. Price, $8.00. To the entomological reader who may have been trying to keep up with the rapidly increasing literature on the physiology of insects, including the results of experimental work in embryology and metamorphosis, this book will be a most welcome relief. Though the science of insect physiology is of comparatively recent development, the very number of papers now published on the subject is discouraging, and the often inconclusive or frequently contradictory results of the writers must leave the average entomologist with a feeling of bewilderment. The author of "The Principles of Insect Physiology," therefore, is to be highly commended on the fact that he has been able to construct an orderly and straightforward text without being lost in a maze of controversial opinion. The treatment of the subject is everywhere convincing that the probable truth has been well sifted from experimental error and unwarranted deductions. The book is not written for the professional physiologist, but clearly presents the subject in a manner suited to the student or teacher who has been brought up on the ordinary entomological curriculum. The 15 chapters deal principally with the purely physiological phases of insect functions, physical mechanisms being in general treated briefly, the apparatus of ingestion entirely omitted. The illustrations, on the other hand, are largely anatomical, since structure is necessarily the basis of function, and they contribute much to the elucidation of the text. To each chapter are appended the pertinent literary citations, from 48 to 265 for individual chapters, probably over 2000 in all. Though titles are not quoted literally, the nature of the subject is given with each reference. The book commends itself on sight by the quality of the typography, the paper, the illustrations, the binding.

The first chapter, perhaps too briefly, treats of the physiological phases of development in the egg. The second and third chapters on the integument and growth are particularly instructive because of the up-to-date description of the structure and composition of the cuticula, the physical and physiological processes of moulting, the physiological factors of metamorphosis, determination of characters in postembryonic development, regeneration, and diapause. Chapter IV deals with the structure and physical properties of insect muscles, and discusses the various modes of locomotion practised by

insects. In Chapter V the general properties and functions of the nervous system are reviewed, and two chapters follow on the sense organs and sensory reactions, in which the text is illustrated with anatomical figures and explanatory diagrams of functional processes. Chapter VIII is devoted to behavior, a large subject necessarily much condensed, but the leading facts of insect activity are classified and described under the three main headings of kinesis, orientation, and coordinated behavior. Chapter IX, on respiration, is one of the important chapters in the book: in it is condensed the results of a great mass of recent experimental work on insect respiration and the chemical and nervous control of breathing movements and the action of the spiracles, besides which it contains a general account of the structure and development of the tracheal system, the mechanism of breathing, and the respiratory adaptations of aquatic and parasitic insects. Chapter X deals with the circulatory mechanism, the blood and haemocytes, the nephrocytes, the fat body, oenocytes, and light-producing organs. Chapter XI is devoted to digestion and nutrition; it includes a general account of the anatomy of the alimentary canal, and discusses the histology and physiology of the digestive processes. Excretion is the subject of the next chapter, in which the histophysiology of the Malpighian tubules is an important part. Chapter XIII, on metabolism, discusses the chemical transformation of food products desposited in the fat body, chemical substances produced by insects, pigment metabolism, and respiratory metabolism. Water and Temperature are the associated subjects of Chapter XIV, since temperature and humidity, the author points out, are the most important factors in the environment that influence the physiology of insects. The final chapter treats of the reproductive system and associated functions, describing briefly the anatomy and histology of the genital organs, and discussing the subjects of mating, impregnation, fertilization, spermatophores, factors controlling fertility and fecundity, modes of reproduction, sex determination, and the transmission of symbiotic micro-organisms.

Though probably it is not possible at present for most schools to give a laboratory course in experimental physiology on insects, "The Principles of Insect Physiology" now furnishes the teacher a well-organized basis for class instruction, and as a reference book it will be indispensable wherever entomology is taught or the biology of insects is studied.—R. E. Snodgrass.

INSECTS OF CITRUS AND OTHER SUBTROPICAL FRUITS by HENRY J. QUAYLE. Ithaca, New York, Comstock Publishing Co., Inc. 1938. Pp. vi, 583. 377 figs. $5.00. The preface states: "An attempt is made in the present volume to discuss fairly adequately the insects that attack, in different parts of the world, a rather limited range of fruits. The title emphasizes the citrus group because that group dominates the field of strictly subtropical fruits; likewise the insects which attack citrus dominate the field of subtropical fruit insects. The list of citrus fruit insects, consequently, is as complete as it has been possible to make it for all the important citrus fruit sections of the world," and the same is said for the avocado insects. The important insects of other subtropical fruits, particularly in the United States, are likewise included. The subtropical fruits dealt with are the citrus group (oranges, lemon, grape-fruit), avocado, vinifera grape, Persian walnut, almond, pecan, fig, olive, date, oriental persimmon, pomegranate and sweet cherry. A key to the principal citrus fruit insects and mites in the United States is arranged under I. Identification by general appearance of the insects and mites, with four subdivisions according to whether they occur on the fruit, leaves, twigs or trunk, and II. General identification by types of injury to the same four parts of the plants. The second and third chapters on the major insects and mites that attack citrus fruits occupy 231 pages, the minor (chapter V) 81 pages, the fourth chapter being devoted to predacious and parasitic insects that attack these fruit pests (8 pages). The citrus section of the book thus constitutes somewhat more than half. It lists 73 major and 470 minor species of insects and mites that attack citrus fruits, belonging to the following groups, the first figure after each name being the major, the second the minor species: Mites 4, 21, Thysanoptera 6, 5, Psyllids 1, 0, Aphids 3, 8, Scale insects 29, 129, Aleyrodids 6, 22, Pentatomid bugs 2, 18, Beetles 4, 112, Butterflies 1, 32, Moths 8, 53, Fruit flies (Trypaneidae) 5, 5, Ants 4, 1. The remainder of the minor species is composed of the following groups not represented in the major list: Spiders 1, Orthoptera 9, Termites 10, Cicadas 1, Cercopids 1, Heteroptera other than Pentatomids 28, Diptera other than Trypaneids 12, Chalcid wasps 1, Bees 1. Each of the sixth to the thirteenth chapters is concerned with the insects and mites that injure one of the next eight fruits above listed, the fourteenth with the last three. Each, excepting the thirteenth and fourteenth, begins with a key to the principal insects that attack the fruit in question. The fifteenth is a brief account of rodents, nematodes and snails that attack the subtropical fruit trees. The sixteenth,

seventeenth and eighteenth are devoted to fumigation, spraying and dusting, and quarantines respectively.

The major and some of the minor insects throughout the book are described at varying length, their areas of distribution, life history, parasites, predators and methods of control are given, with numerous illustrations. The book, therefore, is not merely a treatise on economic entomology; it is a contribution to ecology as well. From the latter standpoint the Introduction, pp. 1-8, is particularly interesting. Numerous references to the literature are given throughout the volume in connection with each group of insects and often with single species. As the authors' work has been mainly in California, that State, its subtropical fruits and their insects receive greater attention than any other area. This is an important and valuable book.—P. P. CALVERT.

THE INSECTS OF NORTH CAROLINA. Being a list of the Insects of North Carolina and their close relatives. By C. S. BRIMLEY, LL. D. North Carolina Dept. of Agriculture, Division of Entomology, Raleigh, N. C. 1938. 560 pp. It is gratifying to the entomologist to see each new state list of insects appear: New Jersey, New York, Connecticut (incomplete) and now North Carolina. Primarily, Dr. Brimley tells us, the credit for the insect survey of the state and for this list belongs to Franklin Sherman, Jr., first State Entomologist of the North Carolina Department of Agriculture, who held the position for a quarter century, 1900-1925. Dr. Brimley was placed in charge of the insect survey in 1919 "and has been doing mainly that sort of work ever since." Statistics of the list are given on pages 12, 13, 506 and 513, according to which the total number of species of insects is 9610, ranging from 2959 Coleoptera to 3 Isoptera; 637 "near insects" are also listed (Arachnida, Diplopoda, Chilopoda, Protura and land and fresh water Crustacea). A comparison with the numbers of species in the New York list of 1928 is included. The typography is rather more like that of the New Jersey list of 1910.—P. P. CALVERT.

ATLAS OF THE SCALE INSECTS OF NORTH AMERICA By GORDON FLOYD FERRIS. Series II, Numbers 137-268. Stanford University Press, Stanford University, California. London: Humphrey Milford, Oxford University Press. Published November, 1938. In the NEWS for May, 1937, page 150, we noticed the beginning of this comprehensive attempt to figure and describe all the North American species of the Coccoidea. As was then and there set forth, each genus and each species

is treated in a separate serial number, usually consisting of four unnumbered pages. Single numbers in any combination or quantity may be had at prices ranging from 15 cents for a single copy to 7 cents each for 50 or more copies. The first series of 136 pieces in loose- leaf form costs $8.00, the bound volume $9.00. Corresponding prices for the second series are $7.75 and $8.75. The first series deals with 34 genera and 100 species, all belonging to the Tribe Diaspidini, Subfamily Diaspidinae, Family Diaspididae. The genera were issued in alphabetical order from *Andaspis to Xerophilaspis.* Under each of these genera the species also were issued alphabetically. The second series, now under consideration, begins with serial number 137, the first 17 numbers comprise 10 additional species of 4 genera included in series I and four species of three additional genera of the tribe Diaspidini. Then follow 19 numbers (4 genera, 15 species) of Tribe Odonaspidini, 2 numbers (1 genus, 1 species) of Tribe Xanthophthalmini, and 94 numbers (22 genera, 72 species) of Tribe Aspidiotini, bringing the end of the series with No. 268. As before, the genera, and under each genus the species, have been published in alphabetical order. The Stanford University Press has issued a circular in connection with series II containing four lists of species for the (*a*) eastern and central U. S., (*b*) gulf states, (*c*) Rocky Mountain, Great Basin and Northwestern States and Northern California and (*d*) Southwestern States (Western Texas, New Mexico, Arizona, Southern California) with a list of those numbers of the Atlas thus far issued which illustrate the scale insects of these respective areas. We congratulate the author and the Stanford Press on the progress made and reiterate our wishes for the successful completion of the Atlas.—P. P. CALVERT.

THE FULGORINA OF BARRO COLORADO AND OTHER PARTS OF PANAMA. By Z. P. METCALF. Bulletin of the Museum of Comparative Zoology at Harvard College, vol. 82, No. 5. Pp. 277-423, 23 pls. October, 1938. This work has already been noticed by a specialist on this group, Prof. Herbert Osborn (Annals Ent. Soc. Amer. 32: 43). It will therefore be of greater value to readers of the NEWS to quote from Dr. Metcalf than to express an opinion on its value. The material on which it is based are collections in the M. C. Z. (by Banks, 1924), the American Museum of Natural History, the U. S. National Museum and that of the author. The general classification used is that of Muir, 1930. An attempt is made to rehabitate the genera established by Stål, and to settle certain genotypes,

using as a basis a card catalog of about three-quarters of a million items dealing with the Homoptera, Copious Keys to subfamilies, tribes, genera and species are given, after having used them repeatedly on a large amount of material in the effort to make them as clear cut and concise as possible. "However, after all care is taken, the use of a key is largely a matter of interpretation. The worker must use all diligence in attempting to get the meaning which all language conveys so imperfectly. . . . The present study further confirms the writer's belief that the genitalia, especially the male genitalia, furnish the most reliable taxonomic and systematic characters. Eventually I believe that the phallic characters will take rank equal to, if not ahead of, chrotic characters in determining the taxonomic and systematic status of the Homoptera." As far as one may judge from the keys in this paper, genitalic characters have been used chiefly for distinguishing species rather than higher taxonomic groups. We looked for the term "chrotic" in Torre Bueno's *Glossary* but found it not. However, the Century Dictionary gave us "*chrotic* pertaining to the skin." Why *chrotic* rather than the more familiar *dermal*, and what is the difference between the Fulgorina (in the title of the paper) and Fulgoroidea at the top of the principal key on page 281?—P. P. CALVERT.

Two Interesting Nests of Tapinoma sessile (Say) in Maine (Hymenoptera: Formicidae).

During the summer of 1938 at Ash Point, Maine, two interesting and rather unusual nests of *Tapinoma sessile* (Say) were encountered. According to myrmecological literature, this ant is noted for its diversity of nesting sites.

The first nest was in a cavity of an old Black Knot canker (*Dibotryon morbosum* (Sch.) T. & S.) which occured at a height of about 4 feet on the dead trunk of a Pin Cherry tree (*Prunus pennsylvanica* L. f.). The small colony after being disturbed several times left the nesting site permanently. The second colony was in the lower part of an abandoned nest of the Northern Yellow Throat Warbler[1] (*Geothlypis trichas brachidactyla* (Swainson)) which was situated about 2½ feet from the ground in a Bayberry bush (*Myrica pensilvanica* Loisel.). This colony was somewhat larger than the former, but did not approach the populous condition of many of the nests of more frequent construction.

MERLE W. WING.

[1] Determination by Mr. H. L. Mendall, Wildlife Dept., Univ. of Maine.

ENTOMOLOGICAL NEWS

VOL. L NOVEMBER, 1939 No. 9

Nymph of the Protoneurine Genus Neoneura (Odonata).

By JAMES G. NEEDHAM, Cornell University.

Among some dragonflies that were sent me for determination in 1935 by Brother Roberto of the Colegio de La Salle, Vedado, Havana, Cuba, were a number of specimens of *Neoneura carnatica*. Having been unable, on two collecting trips to Texas, to find any living specimens of the one species of *Neoneura* known from the United States (*N. aaroni*), and desiring to know what the nymph of the genus is like, I followed up this clue and went to Cuba, to search for it, and got it. In company with Dr. J. C. Bradley, I spent the last ten days of March, 1939, collecting insects in Cuba. We were greatly aided by Dr. S. C. Bruner and his colleagues of the Entomological staff of the Estacion Experimental Agronomica at Santiago de las Vegas, Dr. J. Acuña and Mr. F. de Zayas. The latter took us to see Brothers León and Roberto at the above named college, and from them we received information, and a cordial invitation to *Las Animas*, a retreat maintained for the staff of the college on the summit of a ridge in the Rangel Mountains of Piñar del Rio.

A fine road led westward to the City of Piñar del Rio, and a branch of it northward into the mountains at Viñales. A passable dirt road continued on to El Retiro (where we left it) and northward across the ranges to the north coast. Along the six-mile trail leading from El Retiro to Las Animas I found *N. carnatica* nymphs in abundance.

The very first dragonfly I encountered at El Retiro was a nymph of this species in transformation. It was clinging to the wall of an artificial spring-fed pool a few inches above the surface of the slowly flowing water. I could not then tell that it was a *Neoneura;* it looked like an *Argia*. I sat by it

until the wings were expanded and then popped it and its empty skin inside a little paper bag (a supply of which is ever ready in a pocket of my collecting jacket) and left it to mature its colors. Then with Dr. Acuña's aid, I went collecting adults, among which were a few Neoneuras.

The next place I found it was also at El Retiro, on the cobblestones at the edge of the first ford that the dirt highway crosses going northward. This proved to be the place of greatest abundance of the nymphs. They were found clinging to the stones in the swiftest water and not at all in the slack water at the edges. They cling firmly to the stones when these are lifted and are easily picked off by hand.

A few cast skins were seen sticking to surfaces exposed above the water and two more specimens were taken in transformation. Most of the nymphs were well grown. Evidently the season of transformation was just opening. This was on March 25th.

The next day we went afoot up the rocky six-mile trail to Las Animas, taking most of the day for it, and enjoying the beautiful mountain scenery along the way. I collected a little at every crossing of the stream whose course the trail follows, and found some nymphs of Neoneura in nearly all of them. Always they were clinging to the under surfaces of stones, where they were regularly associated with nymphs of *Scapanea frontalis*. Another lotic species, *Macrothemis celeno*, was more commonly seen on the wing. Its nymph lives in the more quiet places among the rocks of the riffles. Among the weeds at the edges in quieter waters the damselfly *Enallagma cardenium* was ever present, and the adults of that species were far more abundant than the Neoneuras. Dr. Acuña collected several adults of *Protoneura capillaris* along the way but I did not find the nymph.

DESCRIPTION OF THE NYMPH.

The nymph of *Neoneura carnatica* may be characterized as follows:

It measures in length 12 mm. with the gills 5 mm. additional; hind femur [illegible]; width of head 3.5; of abdomen 3.

It is a short stout blackish nymph, in form, widest across

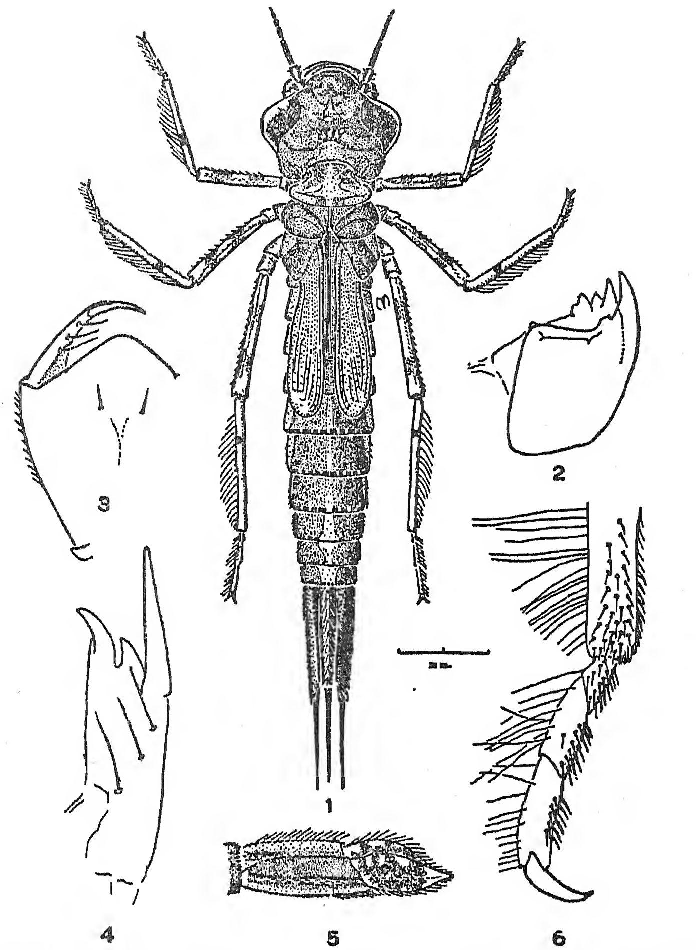


Figure 1. Nymph of *Neoneura carnatica*. 2. Left mandible of nymph. 3. Labium of nymph. 4. Lateral lobe of labium. 5. Lateral view of gills. 6. Tip of tibia and tarsus of mesothoracic leg. (Drawings by Dr. May K. Gyger.)

the head, and tapering rather regularly backward to the tip of the caudal gills. The pale ground color of the body is heavily overlaid with blackish-brown pigment on the dorsum. This appears in a mottled pattern on the frons, in a crossband between the eyes, on the sides of the prothorax, all over the

dorsum of the synthorax and along the sloping sides of the abdomen, on the gills, and as blackish rings on the legs. The abdomen is pale at the sides below the wings, and in a mid-dorsal line from wings backward, the stripe widening on the terminal segments.

The head is broad and flat, widest across the very large eyes, rounded behind the eyes and excavated in the rear. The hind angles are densely spinulose. The antennae are brownish, paler at the joinings of the segments, and seven-jointed. The joints are proportioned in length from the base outward as 5:6:10:6:5:4:3. The labium is short and wide. Its middle hinge lies entirely underneath the prothorax. The mentum is semioval. Its front margin is produced in a broadly rounded entire middle lobe, and there is a single pair of slender minute setae near the middle line. Lateral lobe narrow stout, armed with three lateral setae and a stout incurving movable hook. On the distal end above the stout end hook there is an elongate triangular tooth that is also a little incurved and hook-like. The inner border of the lateral lobe is almost smooth and the usual prominence at its outer end is scarcely discoverable being appressed closely to the end hook.

Prothorax flat above, with its disc rather narrower than the body is below it, and rounded at both its sides and its ends. The anterior end fits closely into the occipital excavation of the head. The synthorax is little depressed. Legs pale; femora with two rings of brown and with touches of the same color on the anterior face at both ends. Tibiae with a single ring of brown at one-third their length; all heavily fringed with long hairs on the posterior margin, and densely beset with sharp spinules on the inner surface toward the tip, as are also the tarsal segments. Those spinules at the extreme tip of the tibiae are spur-like and the others are serrately margined or sub-plumose. The slender wing sheaths reach rearward to the middle of the fifth abdominal segment.

Abdomen slightly depressed basally, regularly tapered from front to rear, becoming cylindric at the tip. The terminal segments decrease successively in length, and the last one bears an apical ring of sharp brown marginal spinules. Gills thick at base and tapering to thin lamellae at the tip, obliquely divided at two-fifths their length into two parts: a thick blackish laterally carinate basal segment that is longer on its ventral margin; and a thin, pointed, apical leaf-like portion, that is paler at margins and apex.

The genitalia are unusually prominent: in the male a pair of stout brown submedian spines on segment 9 that project rear-

ward beyond the apical margin of that segment; in the female the two upcurving ovipositor blades, and their sharp-pointed covering sheaths extend beyond the apex of the 10th segment half the length of that segment.

Specimens are in the Cornell University collection.

On Two Species of Neotiphia from Arizona (Hymenoptera: Tiphiidae).

By V. S. L. Pate, Cornell University.

(Continued from page 224.)

Neotiphia pima[3] new species.

The present species is somewhat intermediate in character between *Neotiphia cockerelli* Allen and *N. conspicua* Allen, agreeing with the former in the cylindrical non-flattened hind metatarsi and with the latter in the conspicuously hirsute margins of the oral cavity, but is readily distinguished from both by the clear hyaline wings, the presence of a low median longitudinal carinula bisecting the median areole of the dorsal face of the propodeum and by a continuous groove about the lateral and posterior margins of the tegulae. In addition, *pima* is separable from *conspicua* by the strongly lineate lateral faces of the propodeum and the differently constructed first abdominal sternite, while from *cockerelli* the present species may be differentiated by the absence of a median longitudinal carina on the sixth abdominal sternite. The female recorded below as the provisional allotype of this species is apparently most closely related to *Neotiphia novomexicana* Allen from which it may be distinguished by the tawny wings, the nitidous clypeal bevel, the complete uninterrupted transverse pronotal carina and the differently shaped median areole of the dorsal face of the propodeum.

Type. — ♂; Wilmot, seven miles southeast of Tucson, Pima County, Arizona. Elevation, 2600 feet. August 25, 1937. (Rehn, Pate and Rehn; at flowers of *Acacia*.) [Academy of Natural Sciences of Philadelphia, Type no. 4199.]

♂.—8 mm. long. Black; mandibles dark red apically; tarsal segments dark fulvous apically. Wings clear hyaline; stigma and veins brunneous.

[3] After the Pima Indians of southern Arizona.

Head fulgid; vertex and upper half of front without acupuncturation, with moderately large punctures of second to third degree density and with a large transverse glabrous nitidous area just before anterior ocellus. Ocellocular line slightly longer than the postocellar line. Occiput and temples with moderate puncturation of second to third degree density and clothed with long suberect light hairs. Margins of oral cavity and ventral aspect of head densely clothed with rather long erect white pubescence. Labium with a median longitudinal groove on basal half to two-thirds. Clypeus and lower half of front opaque and with fine close acupuncturation; the front with larger and coarser superposed punctures of the second degree of density and sparsely clothed with suberect light pubescence; antennocular line one-fourth the length of the eye. Clypeus transverse, subadamantiform, length medially one-half that of eye, with superposed larger puncturation of the first degree of density and clothed with short light aeneous reclinate pubescence; tumid discally and produced medio-apically into acute point, laterad of which the apical margin is oblique and abruptly inflexed. Mandibles punctate on basal half; median longitudinal groove obsolescent or absent.

Thorax fulgid; pronotum dorsally, save for a broad transverse nitidous glabrous arcuate apical band, with sparse scattered puncturation largely of third degree density, acupuncturation absent, anterior dorsal margin with a strong uninterrupted transverse sublaminate carina, lateral faces narrowly above with sparse puncturation of second degree density and with fine very inconspicuous minute microscopic clathrate aciculation below and with an oblique subfoveolate groove paralleling the lower margin. Mesonotum with an irregular row of large coarse close punctures along the anterior edge and the inner margins of the notauli, disc with a large patch of large punctures of second degree density and posterior margin with a small semilunate patch of smaller punctures medially. Scutellum with anterior half, save for a few scattered punctures, practically impunctate, the posterior half with moderately sized punctures of third degree of density. Postscutellum with scattered punctures of second degree of density. Tegulae broader than long and with a groove continuous about lateral and posterior margins. Mesopleura clothed with long suberect white pubescence; anteriorly with a strong epicnemium which is not continued onto mesosternum, devoid of acupuncturation but covered with large coarse punctures of second to third degree density. Propodeum fulgid, glabrous; dorsal face with median areole about as long as broad at base, the lateral

carinae strongly convergent posteriorly, bisected for its entire length by a median longitudinal carinula, the surface minutely rugulose within, laterad of lateral carinae the surface is finely rugulose halfway to the lateral margin beyond which it is sublaevigate, posterior margin of dorsal face furnished with a strong transverse biangulate carina which is foveolate on both sides; posterior face finely rugosopunctate, more coarsely so marginally, without a median longitudinal carinula, lateral margins rather weakly carinate; lateral faces horizontally to obliquely strongly lineate. Hind tibiae with the sensorium elongate, cuneate and moderately impressed. Hind metatarsi cylindical, devoid of short stout spines above.

Abdomen fulgid, without acupuncturation. First five tergites with large coarse punctures of third degree density discally grading to second degree laterally; penult tergite with closer puncturation throughout; ultimate tergite coarsely, closely rugosely punctate, not carinate longitudinally. Tergites with short sparse inconspicuous suberect light subaeneous pubescence, with a transverse subapical row of longer stronger aeneous setulae along the anterior margin of the transverse nitidous apical band. First sternite subfulgid, with a V-shaped carina separating the escutcheon from the disc which is bisected on its anterior half by a high median longitudinal carina emanating from the angle of the anterior V-shaped carina, the disc anteriorly and laterally with large coarse semiconfluent punctures, posteriorly and medially with fine acupuncturation. Sternites with close puncturation of second degree of density and with a transverse row of subapical setulae as on tergites. Sixth sternite with the lateral carinae distinct on apical two-thirds and separated from the median shagreened stripe by a single row of punctures, no median longitudinal carinula present, not produced medio-apically into an emarginate lobe separated laterally by deep rounded notches.

Allotype.—♀; Topotypical; same data as type. [Academy of Natural Sciences of Philadelphia.]

♀.—12 mm. long. Similar to male except as follows: Wings clear hyaline, strongly tinged with fulvous; stigma brunneous, veins fulvous.

Head with puncturation in general similar to male but practically devoid of acupuncturation. Clypeus transverse, semilunate, length medially about one-half that of eye, closely rather finely punctate and with a transverse submarginal carinula which is obsolescent medially on the flat disc, produced medio-apically into a broad transverse arcuate lobe which is

provided with a broad gently deflexed arcuate subnitidous bevel apically. Margins of the oral cavity not densely hirsute as in male. Labium with a median longitudinal sulcus basally.

Thorax with the punctate portion of the dorsal face of the pronotum with the punctures very large, coarse and of the first to second degree of density; lateral faces of pronotum impunctate, save for a marginal row of coarse punctures along the dorsal and anterior edges, the median oblique groove faint and present only medially, the lower half subhorizontally lineate. Mesopleura without an epicnemium anteriorly, punctate as in male. Scutellum with a marginal row of large punctures, otherwise nitidous save for one or two discal punctures. Tegulae broader than long, with a marginal impression continuous about the lateral and posterior edges. Propodeum glabrous, fulgid; dorsal face with the median areole rectangular, one and three-fourths as long as broad at base, the lateral carinae subparallel, bisected for its entire length by a strong median longitudinal carina, finely closely acupunctate within, laterad of the lateral carinae halfway to lateral margins the surface is subopaque and finely closely microscopically acupunctate, the remainder sublaevigate, posterior edge of dorsal face furnished with a strong transverse marginal carina; posterior face with fine microscopic acupuncturation upon which is superposed laterally a stronger scattered puncturation, without a median longitudinal carinula discally, the lateral margins sharply carinate; lateral faces perfulgid, strongly horizontally to obliquely lineate throughout. Hind tibiae with the sensorium cuneate, about twice as long as broad at its widest point and deeply impressed. Hind metatarsi with the longitudinal groove elongate, linear, deeply impressed, and with a double row of three short stout spines above. Fore wing with the stigma small but distinct and definite, extending less than one-half the distance from the origin of the radial vein, which arises distinctly before its apex, to the basal vein.

Abdomen fulgid, without acupuncturation. First four tergites with large punctures of third degree density discally grading to second degree laterally; fifth tergite with large close puncturation; last tergite with the basal two-thirds very coarsely closely rugosely punctured and abruptly elevated above the apical impunctate shagreened thin and foliate portion which is thickly clothed with long sordid light aeneous coarse pubescence basally immediately following the abruptly elevated anterior portion. First five tergites with a transverse subapical row of long aeneous setulae along the anterior margin of the

transverse nitidous apical band; the first four tergites otherwise sparsely clothed with light suberect hairs, the last two tergites more heavily and thickly clothed with similar but more conspicuous pubescence. First sternite with an obtuse tubercle but not with a transverse carina separating the escutcheon from the disc, which is devoid of a median bisecting carina but is finely closely microscopically acupunctate with coarser punctures superposed on the vertical lateral portions and along the anterior margins of the horizontal portion, along the posterior margin of which and the lateral margins posteriorly as well is an impressed submarginal groove. Second sternite with coarse puncturation of second to third degree density, the remaining sternites with similar puncturation of first to second degree density. Sixth sternite with a broad transverse shagreened band on basal third which bears a few moderately large scattered punctures of third degree density laterally, the lateral portions of the basal band abruptly elevated above the distolateral coarsely punctate portions of the sternite and confluent medially with the customary impunctate shagreened median stripe, the lateral margins of which are oblique, bisinuate and convergent apically; the distolateral margins of the sternite furnished with a thick brush of long coarse sordid yellowish hairs.

Paratypes.—7; 6 ♂, 1 ♀, as follows: Arizona: 5 ♂; Wilmot, seven miles southeast of Tucson, Pima County, elevation, 2600 feet; August 25, 1937; (Rehn, Pate and Rehn; at flowers of *Acacia*). 1 ♂; Twin Buttes, near Indian Well, Navajo County; elevation, 5850 feet; July 29, 1937; (Rehn, Pate and Rehn; swept from flowers of *Cleome serrulata* [Rocky Mt. Bee-plant]). New Mexico: 1 ♀; Road pass south of Cienaga Peak, Peloncillo Mts., Hidago County; elevation, 4500 feet; August 27, 1937; (Rehn, Pate and Rehn). [All A. N. S. P.].

Remarks.—The female described above and recorded as the provisional allotype of the present species may eventually prove to be a form discrete from the male in view of the fact that it differs markedly from the type in a number of characters, notably in the much larger size, the tawny wings, the longer parallel-sided median areole of the dorsal face of the propodeum, and the quite differently formed and sculptured first abdominal sternite. However, I attribute these differences

largely to the usual antigeny customarily exhibited by the various species of this general complex. I base this association of the sexes of *pima* upon the fact that both were swept from the flowers of an *Acacia* and taken together in the net, although not in copula.

New Species of Stelis from California (Hymenoptera, Megachilidae).

By E. Gorton Linsley, University of California.

The species of *Stelis* described below belong to an interesting group characterized by small size, robust form, large red tegulae, and a characteristic pattern of eburneous abdominial fasciae. They are best represented in southwestern United States and appear to be parasites of *Ashmeadiella.*

Stelis (Stelidium) hemirhoda new species.

♀ : Small, robust; black, tegulae red, abdomen dominantly red, mouth parts and legs partially red; pubescence white with some brownish hairs on vertex and mesoscutum.

Head wider than thorax; antennae black, flagellum brownish beneath; vertex moderately finely, distinctly punctured punctures very close, interspaces shining, pubsecence dominantly brownish with an intermixture of white; face densely clothed with moderately long, depressed, white hairs which obscure the surface; labrum nearly one and one-half times as long as broad, red to reddish piceous, more coarsely punctured apically, apex broadly truncate; mandibles tridentate, red, base and apex black; cheeks densely clothed with long, depressed, white hairs.

Thorax robust; pronotal tubercles black or obscurely reddish, densely clothed with white hairs which obscure the surface; mesoscutum a little more finely punctured than vertex, punctures mostly less than one puncture diameter apart, pubescence whitish and brownish, sparse on disk, more dense at sides and anterior margin; tegulae large, red, finely and not closely punctured, sparsely clothed with very short, fine, obscure, pale hairs; axillae black, densely clothed with white hairs; mesoscutellum a little more coarsely punctured than mesoscutum, pubescent only along lateral and posterior margins; metanotum densely clothed with moderately long white hairs which obscure the surface; propodeum with triangular area subglabrous,

moderately coarsely, closely, distinctly punctured; mesepisterna and mesosternum compressed antero-posteriorly, a little more coarsely punctured than mesoscutum, densely clothed with long white hairs which obscure the surface; legs black, knees, apex of tibiae, and apex of tarsal segments reddish, pubsecence white, denser on lower side of femora and outer face of tibiae; wings lightly infuscated, first recurrent nervure usually received by second submarginal cell near base, second recurrent received before apex.

Abdomen broad at base, red, tergites clouded with black at sides; first tergite with a narrow, transverse, subapical eburneous fascia, entire or very narrowly interrupted at middle, nearly attaining the lateral margins where it is slightly expanded, eburneous fasciae of tergites two to four successively a little more widely separated at middle and broken sublaterally to form a lateral eburneous spot, the lateral fascia narrower than the break on tergite two, as wide as and wider than the break respectively on tergites three and four, fifth tergite with a pair of short, transverse, dorsal fasciae only; tergites moderately closely punctured, punctures on tergites two to five about as large as those of mesoscutum, a little larger on posterior portion of tergite one, the segments margined apically and laterally with a dense fringe of white, depressed hairs, the margin tending to disappear at middle of tergites one and two; sternites red, closely, distinctly punctured, sparsely pubescent except for lateral and apical margins, sixth sternite subtriangularly rounded, not swollen, apex scarcely prejecting beyond tip of sixth tergite. Length: 4-4.5 mm.

♂ : Black, only the tegulae, labrum, mandibles in part, knees, apex of tibiae, apical margin of tergites, and rarely the abdominal sternites reddish; lateral face marks not present; eburneous abdominal fasciae as in female. Length: 4-4.25 mm.

Holotype female (No. 4810 Calif. Acad. Sci., Ent.), *allotype male* (No. 4811 Calif. Acad. Sci., Ent.) and twenty-eight *paratypes,* six male and twenty-two female, collected by the writer at flowers of *Prosopis juliflora* var. *glandulosa,* near Furnace Creek, Death Valley, CALIFORNIA, April 8, 1939, in the company of several species of *Ashmeadiella.* Three additional specimens were taken at the same locality visiting *Pluchea sericea* (Nutt.). Paratypes will be deposited in the collections of Dr. T. D. A. Cockerell, Mr. P. H. Timberlake, Mr. C. D. Michener, Mr. G. E. Bohart, the Academy of Natural Sci-

ences of Philadelphia and the writer.

This species is apparently to be considered as a *Stelidium* and is related to *S.* (*S.*)*cockerelli* (Hicks), but differs at once from that species in color, arrangement of the eburneous abdominal fasciae, punctation of vertex, and in the form of the sixth abdominal sternite which, in the female, is not swollen and does not project beyond the apex of the sixth tergite. From *S.* (*S.*) *permaculata* (Ckll.) it differs in the absence of lateral face marks in the male, red tegulae, and the arrangement of the eburneous fasciae on the abdominal tergites. In *hemirhoda* there is a single fascia on the first tergite (sometimes narrowly broken at middle) which extends across the segment and nearly attains the lateral margin, and lateral fasciae are present on tergites two to four. In *permaculata*, according to the description, there are four fasciae on the first tergite and the lateral fasciae are not present beyond the third segment.

Stelis (Stelidium) acutiventris new species.

♀ : Small, robust; black, tegulae reddish, abdomen, legs, and mouth-parts in part rufo-testaceous; pubescence white.

Head a little wider than thorax; antennae black, flagellum obscurely brownish beneath; vertex moderately finely, closely, distinctly punctured, sparsely clothed with pale hairs; face densely clothed with long depressed, white hairs which obscure the surface; labrum about one and one-half times as long as broad, black, narrowly margined with rufo-testaceous, punctation moderately fine, close, apex truncate; mandibles tridentate, testaceous, base and apex black; cheeks moderately densely clothed with depressed white hairs.

Thorax robust; pronotal tubercles obscurely reddish, densely clothed with white hairs; mesoscutum less closely punctured than vertex, thinly clothed with depressed white or vaguely brownish hairs, denser along lateral and apical margins; tegulae large, red, finely punctured, sparsely clothed with very short, fine, obscure, pale hairs; axillae black, densely clothed with white hairs; mesoscutellum more closely punctured than mesoscutum, clothed with long, white hairs which are sparse on disk and anterior margin; metanotum clothed with white hairs; propodeum with triangular area subglabrous, moderately coarsely, closely punctured; mesepisterna moderately coarsely,

closely punctured, clothed with dense, long, white hairs, legs black, knees, apex of tibiae, and apex of tarsal segments rufo-testaceous, pubescence whitish, denser on lower margin of femora and outer face of tibiae; wings lightly infuscated, first recurrent nervure received by second submarginal cell near base, second recurrent received just before apex.

Abdomen broad at base, black, tergites one to five with a narrow apical brownish testaceous band, tergites one to three with a lateral rufo-testaceous area; first tergite with a transverse, subapical eburneous fascia which nearly attains the lateral margin where it is slightly expanded, tergites two to four with a median dorsal fascia, constricted but unbroken at middle and a small lateral fascia, tergite five with a pair of short, scarcely separated, dorsal fasciae only, sixth tergite produced at apex as a subtriangular, apically rounded, vaguely longtudinally carinate process; tergites moderately closely punctured, punctures a little larger than those of mesoscutum, margined apically and laterally with a dense fringe of white depressed hairs, broadly interrupted at middle on tergites one and two; sternites black, apical margin of segments one to four rufo-testaceous at middle, one to three broadly reddish at sides; sixth sternite acutely produced beyond apex of sixth tergite. Length: 4.5 mm.

Holotype female (collection G. E. and R. M. Bohart), from Borego Valley, San Diego County, CALIFORNIA, April 8, 1939, collected by R. M. Bohart, to whom the writer is indebted for the privilege of studying the specimen.

This species differs at once from other members of the subgenus *Stelidium* in the remarkable structure of the sixth abdominal tergite and sternite. It is apparently related to the larger *S.* (*S.*) *cockerelli* (Hicks) which has these same segments modified in a different manner. From both *cockerelli* and *hemirhoda* it also differs in color and the arrangement of the eburneous abdominal fasciae.

Stelis (Stelidium) micheneri new species.

♀: Small, robust, moderately elongate; black, tegulae red; pubescence white, with some brownish hairs on vertex, mesoscutum, and abdomen.

Head a little wider than thorax; antennae, including underside of flagellum, black; vertex moderately coarsely, closely punctured, sparsely clothed with erect brownish hairs; face and

cheeks densely clothed with long depressed, heavily plumose, white hairs which obscure the surface.

Thorax robust; pronotal tubercles black, densely clothed with white hairs which obscure the surface; mesoscutum very closely punctured, the punctures a little less coarse than those of vertex, pubescence very sparse, mostly brownish; tegulae large, red, moderately finely but distinctly punctured; axillae black, subglabrous, punctures similar to those of mesoscutum; mesoscutellum punctured as mesoscutum, subglabrous, with a fringe of plumose white hairs along posterior lateral margins; metanotum moderately coarsely, closely punctured, moderately clothed with white hairs; propodeum with triangular area subglabrous, moderately coarsely, closely but somewhat irregularly punctured at base; mesepisterna and mesosternum a little less closely, more coarsely punctured than mesoscutum, densely clothed with long, white hairs; legs black, clothed with white hairs; wings dusky, nervures and stigma nearly black.

Abdomen concolorous black except for eburneous fasciae; tergites one to four with an oval eburneous fascia on each side near lateral margin, rarely with a very small spot on tergite five, dorsal fasciae absent on first and second tergite, usually present as small, obscure, widely separated spots on tergites three and four, integument moderately coarsely, closely punctured, sparsely clothed with erect brownish hairs and with fringe of depressed, white, heavily plumose hairs along lateral posterior margins of segments; sternites one to five coarsely, closely punctured, sixth sternite finely, closely punctured, more or less evenly and feebly convex, not tumid, extending beyond apex of sixth tergite, apex broadly, subtriangularly rounded. Length: 4.5 — 5 mm.

♂: Abdominal tergites with slightly larger, more conspicuous eburneous fasciae, lateral fasciae present on tergites one to five, dorsal fasciae present and distinct on tergites three to five, rarely represented by a small spot on tergite two, dorsal fasciae widely separated, usually slightly transverse. Length: 5 mm.

Holotype female and *allotype* male (Michener collection) from Eagle Rock, CALIFORNIA, May 9, 1936, and four male *paratypes,* two with the same data as the types and two from Altadena, California, June 11, 1933, all captured at flowers of *Cryptantha* by Mr. Charles D. Michener. Additional *paratypes*

include four females from near Rock City, Mt. Diablo, California, May 9, 1939 (G. E. Bohart) and ten females from the same locality, May 12, 1939 (G. E. Bohart and J. W. MacSwain). Paratypes are deposited in the collections of G. E. and R. M. Bohart, C. D. Michener, T. D. A. Cockerell, P. H. Timberlake, the Academy of Natural Sciences of Philadelphia, and the writer.

This species is more elongate than the two described above and differs in the coarser punctation of the integument, structure of the sixth sternite of the female, and arrangement and number of abdominal fasciae. It is apparently most closely related to *S.* (*S.*) *cockerelli* (Hicks), but may be distinguished by the feebly convex, non-tumid sixth sternite and the absence of dorsal fasciae on tergites one and two. The following table will separate the females in this group of species:

1. Abdomen black or with very little reddish, sixth sternite projecting beyond apex of sixth tergite........... 2
   Abdomen dominantly reddish, sixth tergite more or less evenly rounded, not produced at middle, sixth sternite not projecting beyond apex of sixth tergite. 4 — 4.5 mm. Inyo County, California......*hemirhoda*
2. Sixth abdominal tergite distinctly produced at middle, dorsal eburneous fasciae of tergites one to four distinct 3
   Sixth abdominal tergite not produced at middle, apex more or less broadly rounded, dorsal eburneous fasciae, if present, represented by two small, widely separated spots on tergites three and four only. 4.5 — 5 mm. Contra Costa County to Los Angeles County, California ....*micheneri*
3. Sixth sternite swollen, apex rounded; dorsal eburneous fasciae of tergites one to four distinctly separated; vertex and mesoscutum with an intermixture of black hairs. 6 mm. Los Angeles County, California ....*cockerelli*
   Sixth sternite not swollen, apex very acute, dorsal eburneous fasciae of tergites one to four unbroken; vertex and mesoscutum without black hairs. 4.5 mm. San Diego County, California............*acutiventris*

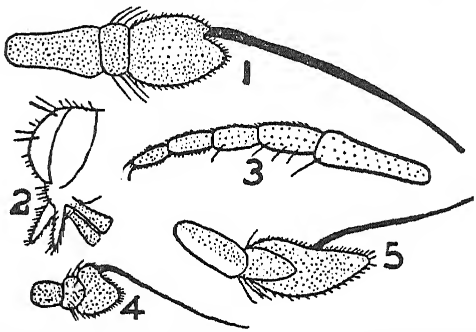
New Utah Dolichopodidae (Diptera).[1]

By F. C. Harmston and G. F. Knowlton[2]

The following three species of apparently undescribed Dolichopodidae are present in the Utah Agricultural Experiment Station insect collection.

Parasyntormon hendersoni n. sp.[3]

♂. Length 2.8 mm.; of wing, 3 mm. Face very narrow, the eyes nearly contiguous below, covered with silvery pollen not hiding the greenish ground color; front blackish dusted with whitish pollen; proboscis and palpi yellowish, covered with minute yellow pile; antennae (fig. 5) black, first joint



1. *Sympycnus utahensis*, antenna, male; 2. *Parasyntormon hendersoni*, hypopygium, male; 3. *Peloropeodes jamesi*, fore tarsi, male; 4. *Peloropeodes jamesi*, antenna, male; 5. *Parasyntormon hendersoni*, antenna, male.

long, yellowish on lower half, second joint overlapping third on inner margin, third joint black, about twice as long as wide, densely pubescent, evenly rounded below, arista inserted near middle of joint.

Thorax shining green; dorsum dulled with brownish pollen; pleurae dulled with white pollen, bristles black.

All coxae, femora, tibiae and basitarsi yellow; fore coxae entirely pale yellow with minute yellow hairs on anterior surface and several black bristles at tip; middle coxae slightly infuscated on outer surface; hind coxae pale yellow, a strong

[1] Contribution from the department of entomology, Utah Agricultural Experiment Station.

[2] Research assistant and research associate professor of entomology, respectively.

[3] Named in honor of Dr. W. W. Henderson, research professor of entomology, Utah Agricultural Experiment Station, who has spent many years in the study of Utah insects.

black bristle at center on outer surface; fore femora without noticeable bristles on lower outer edge; tips of hind femora brown above; fore basitarsi yellow, with three bristles below, second joint less swollen than usual in this genus; third joint hollowed at base with a short, hooked bristle; fifth joint dark brown, hairy, a little widened; middle tarsi infuscated from tip of second joint, hind ones from middle of second joint; first and third joints of hind tarsi two-thirds the length of second. Calypters and halteres yellow, cilia of the former yellowish, appearing brownish in certain lights.

Wings of usual shape, greyish.

Abdomen black, sub-shining, venter yellow on second to fourth segments, this color extends nearly to dorsum on second and third segments; hairs and bristles black. Hypopygium (fig. 2) black, its lamellae small, narrow, fringed with yellowish hairs; the inner appendages black, enlarged and truncate at tips.

Collections. Male taken at Monticello, UTAH, July 28, 1938, by G. F. Knowlton and F. C. Harmston. *Type* in the insect collection of the Utah Agricultural Experiment Station.

Taxonomy. This species is nearest to *P. flavicoxa* V. D. to which it runs in the Van Duzee table of species (The Canadian Entomologist, Vol. LIV, 1922), but differs from that species in the following points: The first antennal joint of *flavicoxa* is entirely black, in *hendersoni* the corresponding antennal joint is yellow on the ventral half; the middle tibiae of *flavicoxa* bears a row of delicate black hairs on the apical half of ventral surface, whereas, the middle tibiae of *hendersoni* are plain, without noticeable hairs.

Peloropeodes jamesi n. sp.[4]

♂. Length 1.8 mm., of wing 2 mm. Face moderately wide, narrowed below, blackish, covered with dark gray pollen; front greenish, dulled with brownish pollen; proboscis and palpi blackish with black hairs; upper orbital cilia black, the lower cilia white; antennae (fig. 4) black, second joint with bristles above and below, third joint scarcely longer than wide, densely pubescent.

Thorax dark shining green, dorsum dulled with brownish pollen; pleurae green, the pollen covering it more white.

[4] This species is named in honor of Dr. M. T. James.

Coxae, trochanters and femora black, tips of the latter brownish; all tibiae brownish yellow; fore tarsi (fig. 3) yellow; infuscated from tip of third joint, its joints as 20-10-7-7-6. Halteres dark yellow, calypters yellow, cilia of the latter black, appearing brownish in certain lights.

Wings grayish, third and fourth veins parallel beyond the cross-vein.

Abdomen black with faint dark coppery reflections; hairs of thorax and abdomen entirely black; hypopygium black with minute whitish hairs at apex, its appendages mostly imbedded.

♀ Length 2 mm. Agrees with male in general body color and color of legs but differs in third antennal joint being shorter and more rounded at tip and in fore tarsi being of plain structure.

Collections. Described from *male holotype, female allotype,* and four *paratypes* all taken at Blue Creek, UTAH, March 30, 1939, by H. E. Dorst, M. W. Allen and F. C. Harmston; 2 males and 2 females taken same locality April 4, 1939, by H. E. Dorst and M. W. Allen and one male and one female taken at Bear River City, Utah, April 4, 1939, by G. F. Knowlton and F. C. Harmston.

Taxonomy. This species is nearest *fuscipes* V. D. but differs from that species in the shape of the third antennal joint which is acutely pointed and about twice as long as wide in *fuscipes,* whereas in *jamesi* the third antennal joint is distinctly rounded at tip and is hardly as long as wide; the abdomen of *fuscipes* is greenish and in *jamesi* is black with faint coppery reflections.

Sympycnus utahensis n. sp.

♂. Length 2.3 mm., of wing 2.5 mm. Face narrow, dark brown, nearly black, lightly covered with silvery pollen; front dark brown, lightly dusted with golden pollen; palpi dark brown; upper orbital cilia black, inferior orbital cilia white; antennae (fig. 1) black, third joint longer than wide, triangular.

Thorax black, with delicate golden-greenish reflections, the dorsum dulled with brownish pollen, the pleurae dulled with whitish pollen; acrostichal bristles small, in a zigzag row before the flattened space on dorsum; a single pair of large, black scutellar bristles and several small hairs on margin of disk.

Coxae and all of legs black; fore coxae clothed on front

surface with white hairs, their tips with white bristles; front femora with two, middle and hind femora each with one preapical bristle; all tarsi plain, first joint of fore tarsi as long as second and third joints combined, the joints of middle tarsi as 11-5-4-3-3, of hind tarsi as 8-7-5-3-3; calypters yellow with black tip, fringed with long black cilia; halteres dark brown becoming lighter near apical portion.

Wings grayish, tip of fourth vein distinctly before apex of wing, wings narrowed at base, fringed along anal margin with prominent, light-colored cilia, sixth vein indistinct, not reaching wing margin.

Abdomen black with greenish-bronze reflections; first segment with a row of black bristles on dorsal and lateral surfaces; hair of abdomen dense and black; hypopygium black, its black appendages of moderate length, fringed with light hairs.

Collections. Described from two males, the *holotype* taken at Cedar Breaks and the *paratype* from Panguitch Lake, UTAH, August 3, 1938 by G. F. Knowlton and F. C. Harmston.

Taxonomy. This is the only North American species of the genus *Sympycnus* known to the writers which is entirely black in color of legs, antennae and body.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( )follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—Andison, H.—A method of mounting entomological specimens in gelatin. [4] 71: 185-187. **Anon.**—Das laufen auf sechs Beinen. [Kosmos] 36: 322, ill. **Bondar, G.**—Notas entomologicas da Bahia. IV. [105] 10: 1-14, ill. **de la Torre-Bueno, J. R.**—On foot notes, glosses, obiter dicta and asides. [19] 34: 223. **Ennis, L. H.**—Insects and light. [Pro. & Trans. So. Lond. Ent. & Nat. Hist. Soc.] 1938-39: 85-88. **Gaul, A. T.**—A method of collecting nests of some social Hymenoptera. [19] 34: 197-198. **Glick, P. A.**—The distribution of insects, spiders and mites in the air. [U. S. D. A.] Tech. Bull. 673: 150 pp., ill. **Henriksen, K. L.**—A revised index of the insects of Gronland. [Meddel. om Gronland] 119: 112 pp. **Holmberg, E. L.**—Obituary. Anon. [104] 10: 91-92. **Immelman, M. N. S.**—On the control of temperature and humidity of air in small cabinets. [Jour. Ent. Soc. So. Africa] 1: 131-136, ill. **Imms, A. D.**—Insects in the upper air. [31] 144: 406. **Klingstedt, H.**—Die Uvarovsche Theorie der Wanderheuschreckenphasen und ihre Bedeutung fur die Zoologie. [51] 19: 1-15, ill. **Moon, H. P.**—Aspects of the ecology of Aquatic insects. [Trans. Soc. Brit. Ent.] 6: 39-49, ill. **Morrison, H.**—Taxonomy of some scale insects of the genus Parlatoria encountered in Plant Quarantine Inspection Work. [U. S. Dept. Agric.] Misc. Pub. 344: 34 pp., ill. **Nielsen, E. T.**—Temperatures in a nest of Bombus hypnorum. [Vidensk. Medd. Dansk naturh. Foren] 102: 1-6, ill. **Omer-Cooper, J.**—The classification of the recent hexapod insects. [Jour. Ent. Soc. So. Africa] 1: 137-148. **Roselli, F. L.**—Sobre insectos del cretaceo del Uruguay o descubrimientos de admirables instintos constructivos de esa epoca. [Bol. Soc. Amig. Cien. Nat. Kraglievich-Fontana] 1: 72-102, ill. **Schmidt, G.**—Gebrauchliche Namen von Schadinsekten in verschiedenen Landern. [Ent. Beihft., Berlin-Dahlem] 6: 1-160. **Schuler, L.**—La localisation des especes rares [Misc. Entomolog.] 40: 27-31. **Voigt, E.**—Weichteile an fossilen Insekten aus der eozanen Braunkohle des Geiseltales bei Halle (Saale). [N. Act. Leopoldina] 6, no. 34 pp. 1-38, ill. **Wheeler, W. M.**—Obituary. By G. H. Parker. [Nat. Acad. Sci. U. S. A.] 19: 203-241, ill. **Williams, C. B.**—An analysis of four years captures of insects in a light trap. [36] 89: 79-131, ill. **de Worms, C. G. M.**—Insects at light. [Pro. & Trans. S. Lond. Ent. & Nat. Hist. Soc.] 1938-39: 80-84.

ANATOMY, PHYSIOLOGY, ETC.—Abeloos, M.—

Etude biométrique des caractères sexuels secondaires (tarses) dans deux espèces de Timarchas (Coleop.). [77] 131: 563-565. **Alpatov, W. W.**—Contribution to the study of variation in the honey bee. [Zoolog. Jour.] 17: 241-245, ill. [Russian, with English summary]. Contribution to the study of variation in the honey bee. [Zoolog. Jour.] 17: 473-481, ill. [Russian, with English summary]. **Anon.**—Bioluminescence in Photobacterium phosphoreum. On the decomposition of chitin by microbiological means. [Proroda-Nature] 1939: 97. **Asahina, S.**—Tonerzeugung bei Epiophlebia-larven (Anisozygoptera). [34] 126: 323-325, ill. **Awati & Dike.**—Histological studies of the digestive system of thrips. [Jour. Univ. Bombay] 7: 67-98, ill. **Becker, E.**—The mouth apparatus of the Anopheles larva and its movements in feeding upon organisms of the surface film of water. [Zoolog. Jour.] 17: 427-440, ill. [Russian, with English summary.] On the mechanism of feeding in larvae of Anopheles. [Zoolog. Jour.] 17: 741-762, ill. [Russian, with English summary]. **Corteggiani & Serfaty.**—Acétylcholine et cholinestérase chez les insectes et les Arachnides. [77] 131: 1124-1126. **Deonier, C. C.**—Responses of the blowflies, Cochliomyia americana and Phormia regina to stimulations of the tarsal chemoreceptors. [7] 32: 526-532. **Evans, A. C.**—The utilisation of food by certain lepidopterous larvae. [36] 89: 13-22, ill. **Evans & Goodliffe.**—The utilisation of food by the larva of the mealworm Tenebrio molitor. [107] 14: 57-62. **Fox, H.**—The egg content and nymphal production and emergence in oothecae of two introduced spp. of Asiatic Mantids. [7] 32: 549-560. Infestation of oothecae of introduced Asiatic Mantids by Podagrion mantis (Orth.: Mantidae; Hymen.: Chalcididae). [7] 32: 561-563. **Fraenkel, G.**—The function of the halteres of flies. [93] 109: 69-78, ill. **Fraser, F. C.**—A note on the function, incidence and phylogenetic importance of the basal accessory antenodal nervures in the order Odonata. [107] 14: 63-68, ill. **Hinton, H. E.**—An inquiry into the natural classification of the Dryopoidea, based partly on a study of their internal anatomy. [36] 89: 133-184, ill.. **Hoffman, C. C. & Nieto Roaro, D.**—Segunda contribucion al conocimiento de los venenos de los Alacranes mexicanos. [An. Inst. Biol. Mex.] 10: 83-92. **Hufner, B.**—Die antennen und antennalen sinnesorganeder Hydrocores mit besonderer berucksichtigung der Nepiden. [Zoologica] 35: 31 pp., ill. **Karandikar, K. R.**—External structures of the

desert locust. [Jour. Univ. Bombay] 7: 3-57, ill. **Knipp, C. T.**—On the path of the firefly while periodically flashing. [Trans. Ill. State Acad. Sci.] 31: 245-246, ill. **Lanchester, H. P.**—The external anatomy of the larva of the Pacific Coast wireworm. [U. S. Dept. Agric.] Tech. Bull. 693: 40 pp., ill. **Lennox, F. G.**—Studies of the physiology and toxicology of blowflies. [Comm. Australia Coun Sci. & Ind. Res.] Pamphlet 90: 24 pp., ill. **Lepesme, P.**—Recherches quantitatives sur la variation artificielle de la teneur en eau de quelques insectes et sa limite mortelle. [Comptes Rend. Sea. Acad. Sci., Paris] 208: 1753-1755. **Lison, L.**—See under Coleoptera. **Losina-Losinski, L. C.**—Frost resistance and anabiosis in the caterpillar of Pyrausta nubilalis. [Zoolog. Jour.] 16: 614-642, ill. [Russian, with English summary]. **Mazia & Jaeger.**—Nuclease action, protease action and histochemical tests on salivary chromosomes of Drosophila. [Pro. Nat. Acad. Sci. U. S. A.] 25: 456-461. **Mellanby, K.**—The physiology and activity of the bed-bug (Cimex lectularius) in a natural infestation. [116] 31: 200-211, ill. Fertilization and egg production in the bed-bug, Cimex lectularius. [116] 31: 193-199. **Noskiewicz & Poluszynski.**—Embryologische untersuchungen an Strepsipteren.. II. Teil. Polyembryonie. [Zool. Poloniae] 1: (1935) 53-94, ill. **Poll, M.**—See underLepidoptera. **Pruffer, J.**—Weitere untersuchungen uber die mannchen-anlockung bei Lymantria dispar. [Zool. Poloniae] 2 (1937): 43-66, ill. **Pussard & Nepveu.**—Quelques caractères des oeufs de Rhytidoderes plicatus (Curculionide) [77] 131: 1097-1099. **Robinson, G. G.**—The mouthparts and their function in the female mosquito, Anopheles maculipennis. [116] 31: 212-241, ill. **Simmons, S. W.**—Digestive enzymes of the larva of the cattle grub, Hypoderma lineatum. [7] 32: 621-627. **Stanley, J.**—Time required for the development of Tribolium eggs at 27° C. [7] 32: 564-569, ill. **Stella, E.**—Studi sulle termiti 1. Comportamento citologico delle gonadi in operai di Reticulitermes lucifugus. [Rev. Biol. Colon. Roma] 2: 81-95. **Steopoe, I.**—Nouvelles recherches sur la sperm atogenese chez Gryllotalpa vulgaris de Roumani. [Arch. de Zool. Exp. et Gen. Paris] 80: 445-464, ill. **Tatum, E. L.**—Development of eye-colors in Drosophila. Bacterial synthesis of v+ hormone. [Pro. Nat. Acad. Sci. U. S. A.] 25: 486-490. Nutritional requirements of Drosophila melanogaster. [Pro. Nat. Acad. Sci. U. S. A.] 25: 490-497. **Tirelli, M.**—Caracteres morfologicos y propiedades fisiologicas de

la sierosa de los huevos de los insectos (Bombyx mori). [115] 13: 177-187, ill. **Woodruff & Seamans.**—The rate of regeneration in the German roach. [7] 32: 589-599. **Zernoff & Kotzovsky.**—La chimiothérapie antituberculeuse chez les insectes. Action du para-aminophènysulfamide (1162 F) chez les chenilles de Galleria mellonella. [77] 131 :1250-1252.

ARACHNIDA AND MYRIOPODA.—**Brett, G. A.**—On the period of survival of the egg, larva, and first nymph stages of the argasid tick Ornithodorous moubata at different relative humidities. [22] 30: 247-253, ill. **Bristowe, W. S.**—The Comity of Spiders. [Ray Soc., London] vol. 1; x + 228 pp., ill. **Canals, J.**—Nuevos Opiliones de la Argentina. [Notas Mus. de La Plata] 4: 143-156, ill. **Hedgpeth, J. W.**—Some Pycnogonids found off the Coast of Southern California. [Amer. Midl. Nat.] 22: 458-465, ill. **Hoffman, C. C. & Nieto Roaro, D.**—See under Anatomy. **Jawlowski, H.**—Contribution to the knowledge of the Diplopoda of Nova Scotia and Newfoundland. [Frag. Faun. Mus. Zool. Polonici] 4: 149-158, ill. **de Mello-Leitao, C.**—Pseudoscorpionidos de Argentina. [Notas Mus. de La Plata] 4: 115-122, ill. **Oudemans, A. C.**—Neue funde auf dem gebiete der systematik und der nomenklatur der Acari. [34] 126: 195-201. **Petrunkevitch, A.**—The status of the fam. Archaeidae and the gen. Landana. [7] 32: 479-501, ill., (k*). **Pinto & Lins de Almeida.**—Sobre o Amblyomma neumanni, parasito do homen na Argentina. [15] 11: 113-124, ill. **Rondelli, M. T.**—Contributo alla conoscenza della fauna Ixodologica Sud-Americana. [Riv. Parassitologia] 3: 39-55, ill. **Stiles & Detwiler.**—Progress report on a survey of the spiders of Iowa. [Proc. Iowa Acad. Sci.] 45: 285-287.

THE SMALLER ORDERS OF INSECTS—**Martin, R. D. C.**—Life histories of Agrion aequabile and A. maculatum (Odonata: Agriidae). [7] 32: 601-619, ill. **Mickel & Milliron.**—Rearing the caddice fly, Limnephilus indivisus and its Hymenopterous parasite Hemiteles biannulatus. [7] 32: 575-580. **Milne & Milne.**—Evolutionary trends in caddis worm case construction. [7] 32: 533-542, ill. **Ross, H. H.**—Three n. spp. of Nearctic Trichoptera. [7] 32: 628-631, ill. **Whitehouse, F. C.**—Notes on some tropical dragonflies. [4] 71: 199-202, (S).

ORTHOPTERA—**Fox, H.**—See under Anatomy. **Klingstedt, H.**—See under general. **Paul & Fox**—The distribution of the mormon cricket, Anabrus simplex in Saskatchewan. [4] 71: 202-204, ill.

HEMIPTERA—**de la Torre-Bueno, J. R.**—Remarks on the subgen. Tivarbus of the gen. Hyalymenus with descriptions of five n. sp. (Alydid.). [19] 34: 177-197, (k*). Two new U. S. records of Heteroptera. [19] 34: 214. **Hungerford, H. B.**—Report on some water bugs from Costa Rica, C. A. [7] 32: 587-588. A Corixid from deep water. [7] 32: 585-586. **Wood, R. W.**—Fire-fly "Spinthariscope". [31] 144: 381; also [68] 90: 233-234.

LEPIDOPTERA—**Brown & Gabriel.**—New forms and spp, in the gen. Catasticta-II. (Pierid.). [19] 34: 203-214. **Dethier, V. G.**—Early stages of some Hesperiinae. [4] 71: 117-118. **Ficht, G. A.**—The development of a second generation of the European corn borer, Pyrausta nubilalis in Indiana. [Pro. Indiana Acad. Sci.] 48: 211-215, ill. **Forbes, W. T. M.**—The lepidoptera of Barro Colorado Island, Panama. [Bull. Mus. Comp. Zool.] 85: 97-322, ill. (k*). **Fournier, O.**—Lépidoptères récoltés a Gaspé, Qué. [Le Natur. Canadien] 66: 191-193. **Frohne, W. C.**—Observations on the biology of three semiaquatic lacustrine moths. [Trans. Amer. Micros. Soc.] 58: 327-348, ill. Biology of Chilo forbesellus, an hygrophilous Crambine moth. [Trans. Amer. Micros. Soc.] 58: 304-326, ill. **Gerasimov, A. M.**—Die Chaetotaxie des Analsegments der Raupen. [64] 24: 71-78, ill. **Hemming, F.**—Notes on the generic nomenclature of the Lepidoptera Rhopalocera, I. [107] 8: 133-138. (*). **Kozhantchikov, I. V.**—On the influence of the environment upon the fertility of Lepidoptera. [Zoolog. Jour.] 16: 643-663, ill. [Russian, with English summary]. **Losina-Losinski, L. C.**—See under Anatomy. **McDunnough, J.**—New North American Geometridae with notes, I. [4] 71: 187-192. Papilio brevicauda in Cape Breton Island, N. S. [4] 71: 153-158, ill. **Poll, M.**—Contribution a l'étude de l'appareil urinaire des chenilles de Lépidoptères. [Ann. Soc. R. Zool. Belgique] 69: 9-52, ill. **Pruffer, J.**—See under Anatomy. **Ridoutt, C. A.**—Dos maripos comunes de Lima: Danaus erippus y D. archippus. [Bol. Mus. Hist. Nat. "Javier Prado", Lima, Peru] 3: 65-70, ill. **Stahler, N.**—Notes on the taxonomy of Noctuid larvae. [55] 15: 123-126. **Vazquez, L.**—Contribuciones al conocimiento de los lepidopteros mexicanos. [An. Inst. Biol. Mex.] 10: 93-101, ill.

DIPTERA—**Baker, R. H.**—A list of robber flies from Coahuila, Mexico (Asil.). [19] 34: 167-170. **Berger & Jaques.**—A preliminary list of the Dolichopodidae of Iowa. [Proc. Iowa Acad. Sci.] 45: 281-282, ill. **Crandell, H. A.**—See under Hymenoptera. **da Fonseca, F.**—Descricao do macho de Flebotomus arthuri (Psychod.). [73] 12: 181-184, ill. Observacao de uma fase do ciclo evoluto de Cuterebra apicalis (Oestr.). [73] 12: 195-196, ill. **James, M. T.**—A review of the Nearctic Beridinae (Stratiomyid.). [7] 32: 543-548, (k*). Notes on my monograph of Odontomyia (Stratiomyid.). [19] 34: 220, (*). Neotropical flies of the family Stratiomyidae in the United States National Museum. [50] 86: 595-607, ill. (*). **Jaques, H. E.**—A preliminary list of the Tetanoceridae of Iowa. [Proc. Iowa Acad. Sci.] 45: 283. **Kyl, G.**—A study of copulation and formation of spermatophores in Melanoplus differentialis. [Proc. Iowa Acad. Sci.] 45: 299-308, ill. **Niblett, M.**—The Mediterranean and other fruitflies. [Pro. & Trans. So. Lond. Ent. & Nat. Hist. Soc.] 1938-39: 89-91. **Phillips, M. E.**—The anterior peristigmatic glands in Trypetid larvae. [7] 32: 325-328, ill. **Rozeboom, L. E.**—The overwintering of Aedes aegypti in Stillwater, Oklahoma. [Pro. Okla. Acad. Sci.] 19: 81-82. **Stage & Yates.**—(Culicidae). See under Coleoptera. **Twinn, C. R.**—Notes on some parasites and predators of blackflies (Simuliid). [4] 71: 101-105.

COLEOPTERA—**Anderson, W. H.**—A key to the larval Bostrichidae in the United States National Museum. [91] 29: 382-391, ill. **Beaulne, J. I.**—A few notes on Chrysomelidae. [4] 71: 163-164. **Bertrand, H.**—Les larves aquatiques des Coléoptères. [La Terre et La Vie] 9: 99-107, ill. **Boving, A. G.**—Descriptions of the three larval stages of the Japanese beetle, Popillia japonica (Coleo., Scarab.). [10] 41: 183-191, ill. **Bryson, H. R.**—Some recent observations on the activities of Phyllophaga lanceolata (Scarab.). [103] 12: 94-95. **Cazier, M. A.**—New western Polyphylla (Scarab.). [19] 34: 199-202. Glyptoscelimorpha viridis [distribution] (Buprest.). [19] 34: 214. **Chagnon, G.**—Contribution a l'étude des coléoptères de la Province de Québec. [Le Natur. Canadien] 66: 166-178. Additions à la faune coléoptérologique du Polypore du Bouleau. [Le Natur. Canadien] 66: 194. **Dahl, R. G.**—A new California Tiger Beetle (Cicindel.). [19] 34: 221-222. **Delkeskamp, K.**—Coleopterorum Catalogus. Pars. 165. Cantharidae. 357 pp.

Donohoe, H. C.—Notes on Coleoptera found in raisin storage. [10] 41: 154-162. **Eckhoff, D. E.**—The Cicindelidae of Iowa. [Iowa State Coll. Jour. Sci.] 13: 201-230, ill. **van Emden, M et F.**—Coleopterorum Catalogus. Pars. 164. Curculionidae: Brachyderinae III. 197-327. **da Fonseca, F.**—Especies de Amblyopinus parasitas de murideos e Didelfideos em S. Paulo (Staphylinid.). [73] 12: 191-194. **Fox, H.**—The probable future distribution of the Japanese beetle in North America. [6] 47: 105-123. **Goodliffe, F. D.**—The taxonomic value of wing venation in the larger Dytiscidae. [Trans. Soc. Brit. Ent.] 6: 23-38, ill. **Hoffmann, C. H.**—The biology and taxonomy of the Nearctic spp. of Osmoderma (Scarab.). [7] 32: 510-525, ill. (k). **Hustache, A.**—Curculionides de l'Argentine et des regions Limitrophes. [104] 10: 3-17. **Jewett, H. H.**—Description of the larva of Ludius divaricatus Lec. (Elater.). [4] 71: 105-108, ill. **Lanchester, H. P.**—See under Anatomy. **Lison, L.**—Contribution à l'étude morphologique et histophysiologique du systéme malpighien de Melolontha melolontha. [Ann. Soc. R. Zool. Belgique] 69: 195-233, ill. **Milliron, H. E.**—A parthenogenetic n. sp. of the gen. Perimegatoma, Dermest.). [7] 32: 570-574, ill. **Minsk & Hatch.**—N. spp. of Amara from Washington (Carab.). [19] 34: 215-218 (k). **Moennich, H.**—List of Coleoptera found living in and on various fungi. [19] 34: 155-157. **Stage & Yates.**—Ground beetles predatory on the eggs of Aedes mosquitoes. [10] 41: 204-206. **Varley, G. C.**—The frightening attitude of two Californian Meloid beetles Phodaga alticeps and Tegrodera erosa. [107] A, 14: 101-102, ill. **Voris, R.**—The immature stages of the gen. Ontholestes, Creophilus and Staphylinus (Staphylinid.). [7] 32: 288-303, ill. **Wallis, J. B.**—Hydaticus modestus Sharp vs. H. stagnalis Fab. in North America (Dystiscid.). [4] 71: 126-127. The gen. Ilybius in North America (Dystis.). [4] 71: 192-199, (k*). **de Zayas, F.**—Dos nuevas especies de Chrysomelidae (Cassidinae) de Cuba. [Mem. Soc. Cubana Hist. Nat.] 13: 253-256, ill.

HYMENOPTERA—Anon.—Some new data on the formation of ant colonies. [Proroda-Nature] 1939: 100-101, ill. **Bugbee, R. E.**—Some notes on the nesting habits of Batazonus navus (Psammocharid.). [103] 12: 87-90. **Cockerell, T. D. A.**—Bees of the genus Centris from Barbados, B. W. I. [9] 72: 142. **Cole, A. C.**—Pseudogynes of Formica

neogagates [Amer. Midl. Nat.] 22: 418-419, ill. A new ant from the Great Smoky Mountains, Tennessee. [Amer. Midl. Nat.] 22: 413-417, ill. The life history of the fungus-growing ant of the Mississippi Gulf Coast. [Lloydia] 2: 153-160, ill. **Crandell, H. A.**—The biology of Pachycrepoideus dubius, (Hymen.), a Pteromalid parasite of Piophila casei (Dipt.). [7] 32: 632-654, ill. **Cushman, R. A.**—New ichneumon-flies parasitic on the hemlock sawfly (Neodiprion tsugae.) [91] 29: 391-402. (*). **Fox, H.**—See under Anatomy. **Gaul, A. T.**—See under General. **Gilliatt, F. C.**—The life history of Allotropa utilis, a hymenopterous parasite of the orchard mealybug in Nova Scotia. [4] 71: 160-163, ill. **Goetsch, W.**—Die Staaten argentinischer Blattschneider-Ameisen. [Zoologica] 35: 105 pp., ill. **Kelley, M. C.**—Spying on Thalessa. [Nat. Mag.] 32: 379-380, ill. **Kennedy & Talbot.**—Notes on the hypogaeic ant, Proceratium silaceum. [Pro. Indiana Acad. Sci.] 48: 202-210, ill. **Mickel & Milliron.**—See under Small Orders. **Smith, M. R.**—A study of the subspp. of Odontomachus haematoda of the U. S. (Formicid.). [6] 47: 125-130, (k). Notes on Formica (Neoformica) moki with description of a new subsp. [7] 32: 581-584. Ants of the gen. Macromischa in the United States. [7] 32: 502-509, ill. (k*). **Soraci, F. A.**—Neodiprion sertifer (Diprionid). [6] 47: 124. **Steyskal, G.**—Distributional notes on Bembicidae. [19] 34: 218-219. **Taylor, L. H.**—Observations on social parasitism in the gen. Vespula. [7] 32: 304-315. **Vesey-FitzGerald, D.**—Observations on bees in Trinidad, B. W. I. [107] A, 14: 107-110.

SPECIAL NOTICES.—Neue untersuchungen uber die fossilen insekten mit erganzungen und nachtragen sowie ausblicken auf phylogenetische, palaeogeographische und allgemein biologische probleme. By A. Handlirsch. [Ann. Naturhist. Mus. Wien] 49: 240 pp., ill.

The Rockefeller Foundation. A Review for 1938, by Raymond B. Fosdick, its President, New York 1939, devotes several pages to jungle yellow fever, vaccination therefor and the spread of the African *Anopheles gambiae* in Brazil. The Annual Report of the International Health Division of the same Foundation states progress made in control and investigation of the arthropod-carried diseases yellow fever, Rocky Mountain spotted fever, sylvatic plague and malaria.

202 Common Household Pests of North America. By Hugo Hartnack. Hartnack Publishing Company, Chicago, Illinois, 1939, 319 pages, many illustrations.—A compact octavo volume, full of worthwhile information on the more common household pests, this little book seems destined to be of real value for professional and layman alike. Its subject matter, on the whole is concise and simply presented in a fresh and informal manner. Copious photographs and diagrams illustrate nearly every pest discussed. The illustrations, often original, but mostly from German sources, offer a pleasant change from more familiar figures, some of which have been in use thirty or forty years. In scope the book includes much that is not found in any other single American work on this subject. Many of Dr. Hartnack's statements are made from information furnished by German authors, who have recently done painstaking work in this field and anyone wishing to go deeper into the subject is advised to consult the originals, of which the present volume gives only excerpts. In addition to the German sources, several American works have been consulted, but the author does not seem to have seen those of Howard or Herrick. Far from limiting his text to insect pests of the household, the author includes other arthropods, as well as the common mammals and even birds. Moreover, his arrangement is systematic, rather than by food materials, as, for example, it is in Herrick's works. Much might be said for both systems of arrangement, but Dr. Hartnack has at least minimized the necessity of knowing the food material of a given pest before his book can be of ready use. Moreover, the author outlines salient structural inter-relationships of the animals discussed, and although the book can in no sense be considered a treatise on the taxonomy of household pests, it does give important taxonomic characters wherever these will clarify identification. The subject matter is limited to the animal kingdom of which two major phyla are discussed, namely the chordata and arthropoda. Under chordata he includes the various house-infesting rats, mice, squirrels, bats, the English or House sparrow and common pigeon or Rock-dove. These alone occupy 22 pages of the text, but the bulk of the work naturally is given to insects of which species belonging to 14 orders are treated in 217 pages. Additional arthropods mentioned include sowbugs, millepedes, centipedes, pseudo-scorpions, harvestmen, true spiders, jumping spiders, mites and ticks. Finally there are chapters on keratin pests, Incinerator fauna, Carcass decomposition, Insect bite statistics, Insectaphobia, Extermination, The household pest problem and

Natural Control. So much for the bare outline of the book's contents. It would be an oversight for any reviewer to overlook the many innovations contained in the volume. Among these may be mentioned the final chapters enumerated above, which are interesting and full of information which the public should have. Dr. Hartnack is at some pains to educate his readers and points out serious, but largely ignored, political injustices and Federal short-sightedness in dealing with the problems of household pests and their control. In many ways he strives to awaken recognition of situations in the United States which should be regarded as well nigh intolerable, but which are actually encouraged, through ignorance, political control, or public indifference. In additional to the essential facts of life history, habits, foods and control measures for the pests, or groups of similar pests discussed, the author often includes interesting accounts of their history, quoting from and even reproducing in facsimile old documents and illustrations of past centuries. The text is adorned with small margin cuts, depicting embarrassing and amusing situations encountered by persons harassed by their insect tormentors. While not contributing to the scientific value of the book, they provide a light and entertaining touch which certainly does not detract from its essential worth. In fact the very absence of the usual "dryness," which this volume happily avoids, and which to some degree at least is responsible for the lack of public interest and intelligence on this subject, is, we feel, one of the many outstanding qualities of the book. The author has made a traditionally uninteresting subject come to life and thereby has made it possible for the layman to inform himself and enjoy the process. Perhaps more remarkable than this, is Dr. Hartnack's whole approach to the problem. It is one which may not be unique but certainly is unusual, and yet constructively advanced over more widely accepted theories. He points out that for centuries, man has labored under the illusion that he was the purpose and center of the universe, and that therefore all things which interfered with his will or well being were his enemies and should suffer destruction or be brought to serve his purpose. The author, however, makes clear that existence on this planet is competitive and that all life has an equal right with man to be established on the earth. He does not, of course, sentimentally infer that we should suffer pests and vermin to flourish at our expense, but recommends that we justify our superiority by using the brains which give it to us. He suggests that in order to control pests, we remove the materials which attract them to in-

accessible places, and that we apply our knowledge of their habits when constructing buildings to build them out. The author contends that if we are so careless as to provide food and shelter for various pests and then find the pests in action, the fault is not theirs but our own. Yet, he concludes, we have always blamed the pests and not ourselves for the depredations they occasion. It is with admitted reluctance, therefore, that he recommends the use of gases and poisons at all—as it were taking unfair advantage of animals which are actually innocent of any crime. Any proponent of this viewpoint would have to recommend practical measures to make it effective. This Dr. Hartnack does not fail to do and stresses the importance of proper organization, local, state and federal, in combating pests, pointing out what has already been done abroad in many specific instances. As an educational theory, as well as in practical application, his point of view would seem to have unlimited possibilities which ultimately could bring us closer to the solutions of our problems than we have ever been before. In the foreword to his work the author asks that his critics judge it on two scores: 1. "Does it give worthwhile information on household pests? Does it make information that is already available more usable Does it stimulate research? 2. Does the work stimulate — thinking about the solution of the household pest problem by organization Or should the field of household pests stay abandoned or nearly so?" To some of these questions, we have already given an answer in the foregoing remarks. Whether or not the work will stimulate research remains to be seen, but the stimulus is there. If we were to criticise any feature of the work unfavorably it would be, perhaps, the index which is not as full as it might be, and could be expanded with greater specific citations. Its use is not made easier by the liberal interpolation of many symbols, explanation of which appears at the beginning of the index, but which are too numerous to remember, and necessitate frequent reference to their key. In the past few weeks several opportunities for practical use of the work have arisen in answering inquiries at the Academy of Natural Sciences, regarding household pests. In every case both text and illustrations have furnished adequate information quickly and this experience though brief, leads us to feel that the work will fully justify its existence. Not only to the professional exterminators is this book of value, but it should be a useful reference work in the household and even the layman will find it interesting reading.

JOHN W. CADBURY, 3rd.

ENTOMOLOGICAL NEWS

Vol. L — DECEMBER, 1939 — No. 10

The Seventh International Congress of Entomology at Berlin.

By J. Chester Bradley, Cornell University, Ithaca, New York.

On the twenty-fourth of June, 1938, a group of American entomologists, some with their families and joined for the trip by friends until the party numbered in all twenty-one souls, sailed down the St. Lawrence on the Duchess of Atholl, bound for the Seventh International Congress of Entomology at Berlin, but intent upon a program of travel and sightseeing before and after that Congress. Intense heat at Montreal gave way to the bitter cold of iceberg-laden seas off the coast of Labrador, and from there for the balance of the summer, we seemed always to be having too much cold for complete comfort or too much rain, or both.

Landing at Belfast on the first of July, we were met by enterprising Irish reporters, who for some reason got the idea that we were hot on the trail of the yellow fever mosquito, and published a notice of our arrival under the heading "Meet public insect enemy number one," disclosing that said mosquito is the culprit. They further informed the wondering Ulstermen that we had no insects with us, that it was not necessary, since a good collection exists in Berlin!

Followed a two-weeks' tour by chartered motorcoach of Ulster, Donegal, the more northern parts of the Irish Free State, Wales and southern England, a week in London, and thence to Newcastle and over the North Sea to Bergen, Norway. Days on the Hardänger, Näro and Aurlands Fjords among the snow clad mountains of Norway, at Oslo, Lake Mjosa and Lillehammer, at Gothenborg in Sweden and Copenhagen in Denmark strongly contrasted in every respect with

those which, just preceding the Congress, were spent in northern Germany, at Hildesheim, in the Hartz Mountains, and in viewing the Wartburg, where Luther was once imprisoned.

The evening of Sunday the fourteenth of August we reached Berlin. Too late we were for the less energetic members of the party to attend the presession social gathering at the University. The apparently limitless and very imposing buffet at that event, at which the congressionists were the guests of the Congress committee, set a standard of lavish hospitality which was maintained if not exceeding at every event of the following week. On this occasion the Reichsnährstand provided the wines, and it afforded opportunity for those curious about such matters to sample wine of Germany's finest and most celebrated types.

On Monday morning the solemn opening session of the Congress took place in the Aula-Gebäude of the University with great eclat and pomp. After an orchestra concert of classical music, the Under Secretary of State in the Ministry of Education addressed the gathering and declared the Congress open. Addresses of welcome were spoken by the Assistant Secretary of State, by His Magnificence, the Rector of the University of Berlin, and by the Chief Burgomaster and President of the City of Berlin; to these Dr. Jordan, Permanent Secretary of the Congress, responded, and then Dr. Jeannel on behalf of the foreign delegates. The President of the Congress, Dr. Eric Martini, Director of the Institute for Tropical Diseases at Hamburg, addressed the session upon the subject of medical entomology. This address was dramatically interrupted by the arrival of a military orderly with a message which he presented to Dr. Martini. The president tore the envelop open; glancing it over he drew himself up and almost barked it out to the assembly—a message of felicitation and good will to the Congress from Adolf Hitler.

General sessions were held on Monday, Tuesday, Thursday and Saturday mornings. The afternoons of Monday, Tuesday, Thursday and Friday were devoted to meetings of sections. Of these the subjects were: Systematic entomology and zoogeo-

graphy; nomenclature and bibliography; morphology, physiology and embryology; genetics; ecology; medical and veterinary entomology; apiculture and sericulture; forest entomology; viticulture, fruit crops and horticulture; field crops and vegetables; the potato beetle; storage pests; pest control; conservation and teaching; and the cockchafer. Potato beetles are now a serious problem in France; they have migrated into Germany but the infestation there is not yet serious. All Europe is awake to the menace of these beetles, as was evidenced by posters we had noticed throughout England and Scandinavia warning anyone who found any to forward them to an experiment station.

More than eleven hundred persons were registered at the Congress, three hundred and fifty of whom came from outside of Germany. About thirty Americans present were registered as full or associate members. Sixty of the members were from England, thirty-five from France, twenty-five from Holland, twenty from Sweden; in all around fifty countries were represented.

Of more than three hundred papers read, one hundred thirty were on economic entomology, seventeen on medical entomology, sixteen on apiculture, the balance on non-applied phases of the science. Seventeen per cent of the papers were read in English, the same in French, four per cent in Italian, forty-two in German. They covered, of course, a very wide range, and the most that can be done here by way of review, is to select, more or less at random, some ideas, suggestions, or facts presented that are of a broad or general interest.*

Dr. Rudolf Heberdey of Graz suggested criteria* by means of which the phylogenetic age of species might be determined from exact knowledge of their distribution, manner of life, and systematic position, as well as of the geological history of the area in which they live, on the ground of certain distributional peculiarities, namely: discontinuous distribution of a

[* Those of the following papers summarized by Prof. Bradley which have been published in full in Band I of the Verhandlungen of the Congress (dated Weimar, April, 1939, and received in the United States in July, 1939, by some members at least) are marked with a star*.—EDITOR.]

form establishes minimum age; discontinuous distribution of closely related forms establishes maximum age for the forms in question, and minimum age for the next higher systematic category; common discontinuous distribution of nearly related forms makes the minimum age of both the forms in question and of the next higher category very probable.

The thoroughgoing analysis of the highly plastic Holarctic species group of *Papilio machaon,** presented at Munich by Dr. K. Eller was a distinct contribution to and illustration of the principles underlying specific and subspecific differentiations of significance to every thoughtful taxonomist: there are sixty-two races of *P. machaon,* twelve of which, according to Dr. Eller, are "refugial races," that is forms which in retreat from the cold of the glacial period, found refuge in as many isolated "refuge areas," and which in postglacial times became in turn centers of dispersal, from which the balance of the races have been subsequently derived.

Along parallel lines was a paper by S. R. Zarapkin, a geneticist of Berlin, entitled "The principal of divergence in the determination of the lesser systematic categories."* In answering the question as to whether we are yet in position to define such categories through divergence and convergence coefficients, he laid down three provisional conclusions, as applying to the Epilachna forms of which he was speaking: The variation of the median character differentiation of one "population" from another, is similar to that of the individuals within the population, and gives the standard deviation Sp and $\pm$ s; the variation of the median character differentiation of a "race" is similar to that of a foregoing population, and gives Sr that fluctuates perhaps from $\pm$ 1 to $\pm$ 2 s; the variation of the median character differentiation of a species remains insufficiently studied, and we can not as yet lay down a formula.

Dr. R. Jeannel presented some of the zoogeographical results emanating from his long study of the Adephaga,* primitive suborder of Coleoptera: to him it appears that the fauna of heterometabolous insects developed in Laurasia (the land masses

of the northern hemisphere), and had for the most part disappeared by the end of the Paleozoic, before the irruption of the Holometabola, which came from Gondwana (land masses of the southern hemisphere); all that we know of the phylogeny and biogeography of beetles accords with this notion of the Gondwanian origin of the Heterometabola. In all of the beetles which the speaker had studied, of which the history extends sufficiently far into the geologic past, there are two categories of lines: the first still occupy the remnants of Gondwana, and represent the survival of species and species groups which evolved on the fragments of that continental mass during the Mesozoic; the others occupy the Holarctic region, and their evolutionary expansion appears to have occurred during the Tertiary. Of the Gondwanian lines of Carabidae there exist three types of distribution: 1) Antarctic Australo-American, illustrated by the very isolated Migadopidae, living in New Zealand, the Auckland Ids., the south of Australia and Tasmania, the south of America and the Falkland Islands; these doubtless date from the Cretaceous, when according to Köppen and Wegner, Patagonia, the western Antarctides, Australia were assembled around the 60°-70° lat. S., and life could be sustained up to 75° lat. S., as under the present antarctic climate; 2) Africano-Brazilian, exemplified by the Hiletidae, as by many other lines, all strictly tropical; the speaker found a more accentuated divergence of characters between the American and African species (distinct genera) than between those of Africa and Madagascar in comparison with Indo-Malaya (subgenera); those of Africa and Madagascar are of the same subgenera, and it is evident that the separation of Madagascar from Africa is subsequent to the separation of the latter from Brazil, contrary to what is generally believed, furthen it occurred during the Tertiary, even later than the separation from Indo-Malaya, which is not in accord with the theory of an Indo-Malagasy continent "Lemuria"; 3) Godwanian-Oriental, that of the great majority of Godwanian lines. The present day species populated all the borders of the Indian Ocean, Australia and sometimes

New Guinea, Indo-Malaya, even Hawaii, Africa, especially eastern, and Madagascar; some have migrated into the Mediterranean Region; from whence they have even spread to the Antilles, a passage which caused Scharff to assume the existence of an Eocene transatlantic land-bridge, although such a supposition is not supported by a single geological fact. According to Köppen and Wegner the north pole during Eocene times was situated at what is now 45°N, south of Alaska and the equator passed through the Antilles and Mediterranean. The North Atlantic was closed by the union of Greenland with Labrador and Norway forming a continuous continent at latitudes of 20° to 35°N, *i. e.* with a climate which would permit and did permit the interpassage of tropical forms, between the Mediterranean and the Antilles, and vica versa; the subsequent cooling of the North Atlantic climate has completely obliterated the intermediate steps of these species.

In the same field was a paper by E. Voss of Berlin on intercontinental distribution of Rhynchitinae, Attalabinae and Apoderinae,* in which after giving the present distribution of each tribe he discussed the origin and subsequent changes of the continental masses from their beginning to the present time; he outlined the tremendous forces which started the continental shifts in the sense of Wegner; and he pointed out the way in which the actuating causes of the changes in the surface of the globe are based on processes inherent in the structure of the earth. In contrast with the statements previously made by Dr. Jeannel as to distribution of Adephaga, the distribution given for the tribe Trachelophorini is of particular interest, for that tribe does not occur in Africa, but is represented by 25 species in Madagascar, and by over fifty in the Oriental Region.

Dr. Kjell Ander spoke on the phylogeny and classification of the Grylloidea and Tettigonioidea, which he considers as together forming the Ensifera. By reason of primitive characters of musculature and of the tracheal system he does not derive the Grylloidea from either fossil or recent Tettigonioidea, but places them as a primitive side-branch. They com-

prise two families: Gryllidae and Gryllotalpidae; Tettigonioidea six: Raphidophoridae, Schizodactylidae, Gryllacrididae, Stenopelmatidae, Prophallangopsidae, and Tettigoniidae. By reason of many primitive characters the Raphidophoridae form the second side-branch of the order, the very isolated Schizodactylidae the third, and the Gryllacrididae the fourth. The three remaining families build a well circumscribed group within which the Tettigoniidae are the most highly specialized family and probably arose from fossil Prophalangopsidae. The author believes that the superfamilies Tridactyloidea and Acridoidea, which form the group Caelifera, may be derived from the fossil families Elcanidae and Locustopsidae, which are true Ensifera.

In a paper on the distribution of the Mantodea* the mantids, Max Beier emphasized the strong divergence between the fauna of the old world and that of the new. He considers the Ethiopian Region as being the center of the distribution, lacking but few of the major groups, with many endemic genera, one subfamily and one tribe. It also has the greatest number of species. Its closest relation is with the Oriental and Australian. The Nearctic fauna is an attenuated offshoot of the rich and highly distinctive Neotropical, but the three endemic Nearctic genera are not so, their nearest relatives being Palearctic.

The relations of Corduliinae to other dragonflies* was discussed by Dr. Douglas St. Quentin of Vienna, with the conclusion that the Corduliinae, Cordulegasterinae and Gomphidae form a natural phylogenetic group which possess in common all characters which in reality separate the Corduliinae from the Libellulinae, with which they have long been associated. These characters lie in the primary antenodal cross-veins, the brace-vein of the pterostigma, the anal triangle, the anal angle, the emargination of the hind margin of the compound eyes, the tibial carinae, the stark differentiation of the male anal appendages and in the auricles. The Corduliinae lack the "oblique vein" characteristic of all Libellulinae, and of them only; both groups differ fundamentally in the structure of the

male genitalia, in the proportinate length of abdomen and hind wing, in color pattern, and in choice of biotope of both larval and imaginal stages. He showed why the dissimilarity of the triangles of fore and hind wing, characteristic of both Corduliinae and of Libellulinae (but also occurring in Petalurinae, Petaliinae, and many Gomphidae) has come about in different ways in the two groups, and is therefore no mark of relationship, and that the "genital lobes," occurring only in these two groups, are also convergent structures. Finally he showed that the labium of Corduliine nymphs can be derived from a stadium similar to that of Cordulegasterinae and Gomphinae, indicating probable relationship to those groups; the labium of the adult shows no such relation, but is on the other hand similar to that of the Libellulinae, whether by relationship or convergence remains still uncertain.

Tea served in the garden of the university each afternoon between three and five afforded a pleasant opportunity to relax from the sessions, to meet one another and to chat.

At six Monday afternoon a scheduled visit to the Biologische Reichsanstalt für Land und Forstwirtschaft at Dahlem, a suburb of Berlin in which many scientific undertakings are housed, afforded opportunity to become acquainted with the official organization of plant research and its application in Germany. The Biologische Reichsanstalt is an institution of the Ministry of Food Stuffs, and works in cooperation with the plant protection offices of the Reichnährstand. The Reichsanstalt is responsible for the research side of the work, and for carrying on experiments to determine the best methods of pest control. The Reichsnährstand is responsible for carrying control measures into effect. The Biologische Reichsanstalt consists of five divisions: Plant Protection; Insecticide and Fungicide laboratory; Botanical division; Zoological division; and the division of Microbiology which includes both bacteriology and mycology. There is no division of entomology, but entomologists are attached to the staff of three of the divisions. In addition to the headquarters in Berlin, the Reichsanstalt maintains eight branch experiment stations, situated in various

parts of Germany, with particular objectives relative to special types of crops.

The Institute of Biology, the Institute of Anthropology and the Botanical Gardens, all located in Dahlem, were also on the program for visiting on Monday afternoon.

A reception was given at the Carl Schurz house on Monday evening to the Americans attending the Congress. Named after the most illustrious of German Americans, the Carl Schurz House is dedicated to the fostering of good relations between the intellectual circles of Germany and America.

On Tuesday afternoon the ladies of the Congress were entertained at a tea, fashion parade and musicale at the Hotel Adlon. Later the Deutsches Entomologishes Institut of Dr. Walther Horn at Dahlem was opened for the inspection of Congressionists; interesting exhibits illustrative of the biology of insects had been prepared for inspection.

A social evening at the Harnack Haus, near Dr. Horn's Institut in Dahlem followed. We were learning by this time a distinction between American and German receptions. In the latter no receiving line is formed, nor do the guests circulate and assemble in groups to chat. Instead one immediately finds a table, sits down, and the eating and drinking continues more or less throughout the evening. Later on every one begins to move about to chat with friends at other tables, or to gather in groups and talk. This same evening the Hymenopterists attending the Congress assembled at one of the city restaurants, and drank some beer together in good fellowship.

Wednesday the paper-reading sessions were replaced by field trips. Bus after bus was filled with congressionists. Then all in a long, long line they drove out into the country into forest lands. There they stopped; we were told to alight, and started off on an almost endless walk through the forest, to which indeed, there seemed little point, for we were too hurried for collecting specimens, and there was nothing in particular to see, except a forest experiment station which we passed with neither stop nor explanation. Again we boarded the buses, and followed one of the famous Reich-

sautobahnen—government auto highways—until we turned off and drew up at a restaurant on the shores of Lake Werbellin, where our great number sorely taxed the capacity; there we enjoyed a delicious luncheon. Afterwards the party was split into four, some to visit the forestry college at Eberswalde where Dr. Schwerdtfeger lectured on the control of forest pests; some to visit a former hunting box of the ex-kaiser at Hubertusstock and listen to a lecture on parasites of native game animals by Dr. Ullrich; others to visit the Cloister Chorin and the great barge-lift at Niederfinow; and some just to ride around Lake Werbellin, with perhaps a dip in its waters.

On Wednesday evening the Zoological Museum of the University was open for inspection. The same evening we were tendered an elaborate formal reception by the Minister of Science, Education and Instruction on behalf of the government. This was given in the great festival room of the "Kroll" and was a very colorful occasion. It might better be termed a banquet than a reception. While seated at tables, eating, the audience listened to several addresses.

On Thursday evening another very elaborate reception was given to the Congressionists at the City Hall, or as they call it "Rathaus," by the Chief Burgomaster and City President of Berlin.

On Friday morning there was a choice of excursions to the Biological Station and reserve at Bellinchen; to Oderberg-Liepe for collecting; or to Potsdam to see the palaces of former royalty. In the evening the Grand banquet and ball in the Marmorsaal of the Zoological Gardens formed the climax of the week's social events. As a charming and appropriate souvenir, a piece of Baltic amber containing a fossil insect was attached to each menu card. A memorable feat of the president on this occasion consisted of repeating an address in quick succession in each of six different languages.

About two hundred and fifty members of the Congress made the trip to Munich Saturday night and the final events of the Congress were held in that city. The committee wished the members to see the rich treasures of art and science amassed

in that old Bavarian capital, for centuries the intellectual center of Germany.

The Burgomaster gave a reception to the Congressionists on the evening of their arrival; the atmosphere of Munich is quite different from that of Berlin, and the reception was less formal; many of the University faculty and leading townspeople had been invited, so that there was opportunity for the Congressionists to become acquainted with Germans in other walks of life. There was an address by Professor Escherich, and entertainment in the way of folk dancing and ballet dancing.

The attractions of greatest interest in Munich were really notable exhibits provided at the library and at the Zoological Museum illustrative of the use of insects in art; these were visited on Monday morning, and in the afternoon a session was held at the Zoological Institute of the University, at which Dr. von Frisch exhibited films dealing with the physiology of the senses and language of bees, and Dr. Eller displayed under biological-ecological headings the complete racial relationships of *Papilio machaon*.

The group of excursionists from America did not continue to Munich, but after the close of the Congress in Berlin, went to Czestochowa, a great pilgrim shrine in Poland where we saw very colorful processions of pilgrims in their beautiful peasant costumes thronging as they have for centuries to the monastery of the Black Madonna. Then we visited Cracow, ancient center of Polish culture, and former Capital, one of the rare old medieval towns of Europe, and so to Banska Bystrica, a typical town among the hills of central Moravia; and from there we went to Budapest where there was a great deal of interest. Certainly outstanding in our memories of Hungary will be the sight of peasants dressed in their gorgeous finery, going to church, at villages on the great Hungarian Plain, far to the east.

Following a stop in Vienna, rest and contrast after a strenuous summer was afforded among the forested Alps of Upper Austria, at the Almsee, lovely lake, nestled deep within the

mountains, rarely visited by foreigners, and with only a single primitive hostel where guests may be accommodated.

After a few days in Munich, and a week among the high Alps in Switzerland, including a day of cold glorious sunshine spent at the Jungfraujoch overlooking the incomparable glaciers and snowfields on the south of the Jungfrau, we reached Paris, where we were rejoined by some members of our party who had left us in Austria to visit Italy; so the summer passed, and soon the party was again at sea, this time on the swift Empress of Britain, swiftly, if not too steadily, speeding homeward to Quebec.

In the light of more recent events, one can publish this paper only with a feeling of great sadness. Since our visit the evil shadow of Germany has spread over Moravia, and the long night has descended upon Poland. Our German hosts are at war with our French and English colleagues and no man can forsee the outcome, except that the torches of learning will be dimmed. Perhaps not again in our time can we foregather for such a congress; but the tragic experience of our generation may teach those yet to come that the path of mankind must be lighted by the torches of science, of knowledge, and of human experience, and that neither the democratic masses, deep within the shadows far in the rear of the light, nor unbalanced theorists holding false lures over treacherous side-paths, nor dictators, without light of their own, but following self-interests, shall be allowed to determine the paths which mankind shall tread.

A New Entomological Publication.

The Entomological Society of Washington has recently carried out the plan conceived long ago, of beginning publication of its memoirs. "The North American Bees of the Genus Osmia," by Grace A. Sandhouse, constituting memoir number 1, has been received recently from the press of the Monumental Printing Company, Baltimore, Maryland. This memoir can be obtained at $3.00 by addressing the Corresponding Secretary of the Society at the Bureau of Entomology and Plant Quarantine, Washington, D. C.—D. J. Caffrey.

A Black Widow Spider in a Minnesota Winter (Araneae, Theridiidae).

By JOHN P. TURNER, University of Minnesota.

The possibility of being bitten by a black widow spider during a snow storm in zero weather in Minnesota is not very great, but my recent experience indicates that it probably can happen here. The unusual circumstances seem worth recording.

On December 28, 1938, while purchasing provisions at a grocery store near the University of Minnesota campus in Minneapolis, I was presented with an iced tea-size advertising glass with an aluminum top which fitted on like a small cocktail shaker top. Inside the glass was an advertising leaflet. Without removing the top I placed the glass along with my purchases in a paper bag, drove four miles home through the snow-filled air which had warmed up to 15° from the day's low of 5° F. below zero. Shortly after reaching home my wife and I were opening the packages and she removed the lid from the glass, started to reach inside for the advertising folder when the telephone distracted her and she set the glass down on the table in front of me. As I reached for it, a spider crawled from between the leaves of the folder and started scrambling around in the glass. I lost no time in recapping the glass as I recognized the intruder as *Latrodectes mactans.* My identification was confirmed by Dr. Harold Shepard of the Division of Entomology and Economic Zoology of the University of Minnesota. The red ventral spots were connected in a nearly perfect hourglass. There was a row of orange-red spots running down the mid-dorsal line of the abdomen, and three short, oblique, yellow bars on the dorsal-lateral surface of the abdomen, (an indication of its immaturity. The legs were marked with lighter colored bands on the proximal ends of each tibia, but otherwise the spider was black. After shrinkage in 70% alcohol the abdomen measured about 4 mm. long, 3 mm. high and 2½ mm. wide, and was obviously an immature female.

Where did the spider come from? The grocery people were sure that the tops had not been removed from the shaker glasses. The company advertising the product said the gift glasses were packed, with the tops on, in West Virginia not later than October. Therefore, either the spider survived a nearly air-tight confinement in the glass for two months and a freight journey half way across the country in freezing weather, or else the spider got into the glass after reaching Minnesota in mid-winter. The latter alternative seems unlikely, especially as no black widow spiders have been reported from this immediate locality even in summer.

In either case this record indicates that even the zero weather of a Minnesota winter is not absolute protection against the dissemination of, nor the possible injury from, this dangerous spider.

Corrections and Additions to the Clemson List of Scarabaeidae and Other Records from South Carolina (Coleoptera: Scarabaeidae).

By O. L. Cartwright, Clemson, South Carolina*

In the five years since publication of a list of Scarabaeidae collected at Clemson, South Carolina (Entomological News, XLV, 1934, pp. 237-240, 268-269), sixteen additional species have been taken in the same small area, bringing the total to 163 species of 51 genera of the family. These additions have been as follows:

Aegialia blanchardi Horn—March 20, 1935.
Ataenius lecontei Har.—July 28, 1937.
A. alternatus (Melsh.)—August 17, 1935.
A. schwarzi (Linell)—July 20, 1935.
A. erratus Fall—July 19, 1934.
A. brevis Fall—July 28, 1937.
Psammobius interruptus Say—May 12, 1936.
Pleurophorus batesi Arrow—September 10, 1937.
Saprosites ventralis (Horn)—April 14, 1938.
Odontaeus liebecki Wallis—October 13, 1934.

* Technical Contribution No. 70 from the South Carolina Experiment Station, Clemson, South Carolina.

BOLBOCEROSOMA TUMEFACTUM (Beauv.)—June 1, 1937.
TROX SORDIDUS Lec.—March 16, 1936.
PHYLLOPHAGA CERASINA (Lec.)—July 24, 1931.
P. KNOCHI (Gyll.)—July 9, 1936.
HOPLIA TRIFASCITA Say—April 21, 1933.
ANOMALA KANSANA H. & McC.—June 10, 1936.

In the original list two species were listed incorrectly. *Aegialia conferta* Horn should have read *Aegialia conferta* var. *punctata* Brown and the species erroneously determined as *Aphonus tridentatus* (Say) should have been *Aphonus variolosus* Lec.

Other records, which may add to the known distribution of Scarabaeidae, have furnished interest and some surprise in studying the fauna of South Carolina. Unless stated otherwise, the following were collected and determined by the writer:

PHANAEUS NIGER d'Ols., Walterboro, September 12, 1933, Geo. Johnson.

COPRIS TULLIUS Oliv., two mountain localities: Jocassee, July 13, 1936, J. A. Berly, and Cashier's Valley Road, Oconee Co., October 3, 1934.

ONTHOPHAGUS POLYPHEMI Hubbard, in burrows of gopher turtle, Tillman, August 15, 1931.

AEGIALIA HUMERALIS Brown, Chatooga Fish Hatchery, Oconee Co., April 26, 1935. (Compared with type by W. J. Brown).

APHODIUS TROGLODYTES Hubbard, in burrows of gopher turtle, Tillman, August 15, 1931.

A. VESTIARIUS Horn, Tillman, September 27, 1938.

A. PHALERIOIDES Horn, Ocean Drive Beach, August 20, 1934.

ATAENIUS CAROLINUS Van Dyke, Sassafras Mountain, June 16, 1937.

PSEUDATAENIUS SOCIALIS (Horn), Charleston, June 15, 1930, Summerville, July 9, 1936, Monck's Corner, July 7, 1936.

South Carolina males of this species show an extreme development of the terminal spur of the anterior tibia. The spur is quite long, half as long as the inner margin of the tibia, gradually twists to the right and doubles its width at two-thirds its length, then curves inward to an acute incurved tip. Examination of a series of specimens in the U. S. Na-

tional Museum from various localities from South Carolina to Kansas shows a gradual change in the length and shape of the spur to the normal short spur of the mid-western specimens.

DIALYTES STRIATULUS (Say), three mountain localities: Long Creek, Cashier's Valley Road and Sassafras Mountain, July 20 to October 24.

SERICA DELICATA Dawson, Blackville, April 1, 1938, trap light.

PHYLLOPHAGA ARKANSANA Schffr., Florence, St. Paul, and Columbia, April 21 to July 12.

P. POSTREMA Horn, Florence, Summerton, and Georgetown, June 3 to July 19.

P. CALCEATA Lec., Saluda, May 8, 1931, F. Sherman.

P. CUPULIFORMIS Langston, Meredith, April 29, 1927, and Conway, May 17, 1932.

P. MARIANA Fall, Blackville, June 8, 1938.

P. FLORIDANA Robinson, Monck's Corner, August 17, 1931, F. Sherman.

DICHELONYX ELONGATA (Fab.), Sassafras Mountain and Chatooga Hatchery (Oconee Co.), May 20 to June 3.

D. DILUTA Fall, Sassafras Mountain and Chatooga Hatchery, May 18, 20, 1937.

D. ALBICOLLIS Burm., CCC Camp F-2, Oconee Co., June 4, 1937, F. Sherman.

ANOMALA MENDICA Csy., White Pond, June 8, 1939.

A. PARVULA Burm., Florence, Manning, and Blackville, May 29 to July 14.

CYCLOCEPHALA PARALLELA (Casey), Summerville, Florence and Charleston, June 2 to July 12.

C. NIGRICOLLIS Burm., Columbia and Summerville, June 20 and July 5.

C. PUBERULA (Lec.), Charleston, June 9, 1934, J. P. DeVeaux. Georgetown, June 13, 1937, C. B. Eaton.

PSILOCNEMIS LEUCOSTICTA Burm., Clarendon Co., near Santee River, August 1-9, 1896. Specimens in H. C. Fall collection.

CREMASTOCHEILUS CASTANEAE Knoch., Sassafras Mtn., May 15, 1931, F. B. Whittington, and Chatooga Hatchery (Oconee Co.), April 26, 1938, J. N. Todd.

OSMODERMA EREMICOLA Knoch., Greenville, May 17, 1930, H. K. Townes, Jr., and York Co., Louetta Youngblood.

Nitidulid Notes and Descriptions (Coleoptera).

By H. R. Dodge, Clintonville, Wisconsin.

Epuraea flavomaculata Mäklin is a distinct species and not closely related to *terminalis* Mann., or *immunda* Sturm, with which it was considered synonymous by Reitter in 1873. It is easily distinguished from the latter by its quadrimaculate elytra and the two structural characters, namely, middle tibiae of the male unmodified and intercoxal process of abdomen broad and obtuse; characters which apparently neither Reitter nor Horn could observe in their examination of Mäklin's types. This species therefore belongs to Group II of Horn's key, among the species with abdominal intercoxal process broad and obtuse. A key for these species is proposed below.

The type specimens were taken from the Kenai penninsula, Alaska, under the bark of trees. There is in the U. S. National Museum a series of this species determined by the late E. A. Schwarz and collected by Mr. Hubbard at Beaver Mine, Algona, Ontario, Sept. 14 and 16, 1889. Other records of this species are Detroit, Michigan, Itasca Park, Minnesota, Mt. Washington, New Hampshire and Cloudcroft, New Mexico.

Key to *flavomaculata* and allies

1. Elytra not spotted ....(2)
   Elytra spotted ....(4)
2. Elytra very broadly truncate behind, apex subequal in width to base; male first ventral with 2 longitudinal rows of hairs ....*alternas* Grouvelle
   Elytra narrowing to the truncate apex; male first ventral not modified ....(3)
3. Elytra narrowly margined; pubescence above grey, not conspicuous ....*ovata* Horn
   Elytra more widely margined; pubescence above long, conspicuous due to silvery luster ....*populi* sp. nov.
4. Disc of pronotum uniformly dark colored; posterior male femora simple; body oblong, depressed....*flavomaculata* Mäklin
   Pronotum with a median longitudinal pale stripe; posterior male femora obtusely subangulate; body form more oval and convex ....*peltoides* Horn

Epuraea populi sp. nov.

♂ *Holotype*. Oval, subdepressed. Body piceous, under surface with brownish tinge. Moderately shining, sparsely clothed with prostrate, silvery hairs, which often are not directed straight backwards. Body above and below with uniform, close, moderately coarse punctures with the following exceptions: mesosternum, prothorax below the basal angles and on a space external to the coxae and extending anteriorly, impunctate; prosternum sparsely, indistinctly punctate.

Labrum not deeply bilobed. Antennal joints 3-5 elongate, equal in length to club, 3 and 5 subequal in length, 4 shorter, 5-8 moniliform, club elongate, 1½ times longer than wide.

Thorax 2.23 times broader than long, broadest at basal third, thence narrowing slightly to the square basal angles and hardly arcuately converging to the rounded anterior angles, base very feebly bisinuate, apex broadly emarginate, lateral margins explanate. Elytra conjointly slightly longer than broad, lateral margins explanate, feebly arcuate and narrowing posteriorly to the truncate apical margin. Upper surface of body slightly irregular due to three feeble transverse impressions on disc of each elytron one at basal and apical fourths and one just before the middle, and an inward extension of the depressed lateral thoracic margin at the basal third. Tarsi dilated; tibiae slender, not modified.

Intercoxal process of abdomen broad and obtusely angled. Male with the extra anal segment.

Dimensions: length 2.81 mm., width 1.74 mm., pronotum .71 mm. long, 1.6 mm. wide at widest point, elytra 1.74 mm. wide, 1.79 mm. long.

♀ *Allotype*. Quite similar to the male in all respects but lacking the dorsal anal segment. Dimensions: length 2.86 mm., width 1.79 mm., pronotum .7 mm. long, 1.53 mm. wide, elytra 1.89 mm. long, 1.79 mm. wide.

Specimens vary from 2.2 to 3.32 mm. in length, and are 1.6 to 1.64 times longer than wide. The under surface is usually slightly browner in color than the upper, though from above the lateral margins of pronotum and elytra are also brownish. There are minor variations in the squareness of the truncature of the elytral apex, width of pronotum in comparison to the elytra, and position of the widest point of the thorax (in some this is appreciably behind the basal third), but none of these characters can be correlated with sex. The tip of the

abdomen is deflexed in most specimens, and therefore usually completely concealed from above.

This species is most closely allied to *flavomaculata*, from which it is distinguished by its uniform dark color, oval shape and more conspicuous vestiture. From *ovata* it is distinguished by the vestiture, broader form, more widely margined elytra, and thorax scarcely constricted at base.

Holotype and allotype were collected at Itasca Park, MINNESOTA, June 15, 1937, and July 9, 1936, respectively; 11 paratypes were collected at the same locality, May 17 to June 15, 1937; 2, Ramsey County, Minn., July 25, 1936; 1, Olmsted County, Minn., C. N. Ainslie Collection; 2, Cheboygan County, MICHIGAN, June 30 and July 5, 1935, collected at light by Milton Sanderson.

The holo- and allotype are deposited in the United States National Museum ; other specimens are in the collection of the American and Field Museums of Natural History, University of Minnesota, University of Kansas, K. M. Fender, Academy of Natural Sciences, Philadelphia, and the author.

All but three of the specimens were taken by myself upon the bark of aspen, *Populus tremuloides*, in a recently dead or dying condition. These trees emit a yeasty odor due to fermentation and are usually infested with ambrosia beetles. The beetles are semi-active during the day.

NITIDULA FLAVOMACULATA Rossi is a European species not previously recorded from this continent. There are before me specimens from Oakland and Almeda County, California, Oct. 1933 and March 1934 respectively, collected by J. E. Blum, and one specimen in the U. S. National Museum is labeled "Washington, D. C., 13-4-34". This species is piceous, with the legs, antennal stem, sides of pronotum, and epipleura, humeral region and discal spot of each elytron yellow. The discal spots are nearly contiguous, being separated by a very narrow sutural dark stripe, and are joined to the humeral spot by a narrow stripe of yellow.

NITIDULA CARNARIA Schäll. was first recorded in this country in 1926, in Leonard's "A List of the Insects of New York," from "N. Y." and West Point, N. Y. I later recorded it

from Madison, Wisconsin, and Oakland, California. Other records are New England, Aurelius, Michigan, Marion County, Indiana, Urbana, Illinois, Easton, Pennsylvania, and New Foundland, New Jersey. The Pennsylvania specimen was collected May 7, 1909.

Colopterus gerhardi sp. nov.

From Illinois comes the surprising discovery of a *Colopterus* remarkably distinct from our other five well-known species.

♂ *Holotype.* Broadly oval, depressed, elytra individually broadly convex. Nearly uniform testaceous brown, the head, scutellum, outer and apical elytral margins and an oval median thoracic spot vaguely darker, antennae testaceous at base, gradually darkening to the piceous club. Moderately shining, sparsely clothed with short, yellow pubescence.

Head moderately punctate, pronotal punctures coarse, shallow, separated by more than their diameters upon the disc, but more closely spaced laterally, scutellum impunctate on posterior fourth, elytral punctures ill-defined, arranged in 19 indistinct but definite rows, abdominal tergites regularly punctured, the punctures of the same size and density as on head and scutellum, punctuation below slightly finer, except for the impunctate sides of the prothorax. Labrum bilobed; antennal segments 2-6 longer than wide, 3 longest, 6-7 moniliform, 8 transverse, club 3-segmented, 1.6 times as long as wide.

Pronotum strongly transverse, 2.25 times as wide as long, widest slightly before the basal angles which are rectangular, sides regularly arcuately narrowed to the apex, basal margin sinuate on each side, disc with a well-defined sulcus extending medianly from the basal angles and continued by a vague depression which recurves to the basal margin. Elytra strongly descending on the sides to the narrowly reflexed lateral margins; posterior margin and suture, especially just behind the scutellum, depressed, each elytron broadly convex when viewed either from the side or from behind, apices each rounded truncate, exposing two abdominal segments and the posterior angles of the third.

Lateral margin of last abdominal sternite with six fine denticles, apical margin bisinuate, nearly truncate, due to the presence of the anal male segment, which is nearly concealed from above.

Dimensions: length 3.5 mm. with head somewhat deflexed, width 2.23 mm., pronotum .92 mm. long, 2.08 mm. maximum

width, 2.04 mm. at basal angles, 1.13 at anterior angles, elytra 2.23 mm. wide, 1.93 mm. at humeral angles, 1.47 mm. maximum length and 1.26 mm. from base of scutellum to apex of suture.

Holotype. Olive Branch, ILLINOIS, X: 7:09, under bark of sycamore, Wm. J. Gerhard, collector, in the Field Museum collection. The type locality is near Thebes, Alexander County, southern Illinois, on the edge of the Mississippi River bottom.

This species is related to *Colopterus morio* Er. by its sulcate thorax, but differs strikingly from all our forms by the convex elytral outline. In this character it resembles *inflatipennis* Sharp of Mexico, but that species lacks the pronotal sulci. It cannot be identified as any of the numerous neotropical species, and none of the latter have been recorded north of Mexico.

CARPOPHILUS RUFUS Murray has been considered by Horn to be a variety of *melanopterus* Erichson. There is no apparent external structural character by which the two may be separated, and an examination of the male genitalia has not shown significant differences. However the color pattern is fundamentally different, and for this reason I believe it will prove to be a valid species. A large number of *melanopterus* have been observed and they are very constant in coloration. The body is red, with black antennal club and jet black elytra, and this black color develops before the body wall has hardened. *Rufus,* on the other hand, has always reddish brown elytra, and in fully colored specimens the body is conspicuously darker than the elytra, just the reverse of the case in *melanopterus*. The only host data for *rufus* I have seen is cactus blossoms, and these were probably prickly pear. *Melanopterus* occurs in the flowers of yucca, and apparently is spread by the cultivation of its host plant, for it has been taken at Amherst, Massachusetts. Other localities in the literature and from my records are Columbia, South Carolina, Florida, Georgia, Texas, Mexico; Downer's Grove, Dubois and Urbana, Illinois, and Putman and Marshall Counties, Indiana. *Rufus* has been recorded from Central America and "U. S."; other localities are Eastland County, Texas, Hamilton County, Kansas, Meadville, Nebraska, and Rapid City, South Dakota.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( )follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—A. D. I.—Lower Permian Insects of Kansas. [31] 144: 641. **Fernald, H. T.**—The history of entomology at the Massachusetts Agriculture College, 1867-1930. [Fernald Club] Spec. Publ., no. 1; 55 pp. **Horn, Walther.**—Obituary by R. Korschefsky. [2] 35: 177-184, ill. **Imms, A. D.**—A 'safe' fluid for museum use. [31] 144: 599-600. **Porter, C. E.**—Notas de parasitologia. [44] 42: 122-124, ill. Algunos insectos de las provincias de Atacama y Coquimbo. [44] 42: 154-55, (S). Entomologia Chilena: Localidades nuevas de algunas especies. [44] 42: 166-169, ill. Notas breves de entomologia agricola. [44] 42:171-172. **Thompson, W. R.**—Biological control and the theories of the interactions of populations [116] 31: 299-388. **Tykac, J.**—L'influence des rayons ultra-violets sur les insectes. [Casopsis] 35: 68-70. (Russian, French summary). **Weiss, H. B.**—The entomology of Thos. Boreman's popular Natural Histories. [6] 47: 213-217. **Williams, C. B.**—An analysis of four years captures of insects in a light trap. Pt. I: General survey; sex proportion; phenology; and time of flight. [36] 89: 79-132, ill.

ANATOMY, PHYSIOLOGY, ETC.—**Applegarth, A. G.**—The larva of Apterobittacus apterus (Mecoptera). [Microent.] 4: 109-120, ill. **Ferris, G. F. & Rees, B. E.**—The morphology of Panorpa nuptialis (Panorpid.). [Microent.] 4: 79-108, ill. **Haberman & Cumley.**—Serological investi-

gation of Drosophila antigens using the precipitation reaction. [6] 47: 219-226. **Hilton, W. A.**—Nervous system and sense organs, LXXIX: Diptera. [13] 31: 54-62, ill. **Katzin & Kirby.**—The relative weights of termites and their protoza. [Journ. Parasitol.] 25: 444-445. **Maluf, N. S. R.**—Physiology of the Arthropodan circulatory mechanisms. [6] 47: 227-286, ill. **Minkiewicz, R.**—Les sexues du Leptothorax clypeatus et la probleme de la sexualisation somatique chez les fourmis. [Bull. Ent. Pologne] 16-17: 215-239, ill. **Nakagawa, Y.**—Types of tracheal distribution on silk glands lepidopterous larvae. [Trans. Kansai Ent. Soc.] 9: 41-43, ill. **Oosthuizen, M. J.**—The body temperature of Samia cecropia as influenced by muscular activity. [Jour. Ent. Soc. So. Africa] 2: 63-73, ill. **Smith, S. G.**—Cytology and parthenogenesis of the spruce sawfly, Diprion polytomum. [Trans. Ry. Soc. Canada] 33: 214. **Sparrow & Reed.**—Disproportionate effects of plus and minus bristle genes in Drosophila melanogaster. [Trans. Ry. Soc. Canada] 33: 215. **Strebel, O.**—Biologische Studien an einheimischen Collembolen, III. [56] 17: 272-291. **Wenig, K.**—Vitamin requirement of insects. [Casopis] 35: 16-20. (Russian, English summary).

THE SMALLER ORDERS OF INSECTS.—Applegarth, A. G.—The larva of Apterobittacus apterus (Panorpid.). [Microent.] 4: 109-120, ill. **Bailey, S. F.**—A n. sp. of thrips from the Mojave Desert. [55] 15: 168-172, ill. (k). **Campos, R. F.**—La brillante y fantastica Libellula Megaloprepus coerulatus (Odonata). [44] 42: 129-130. **Ferris, G. F. & Rees, B. E.**—(see under Anatomy). **Hood, J. D.**—A new Polyphemothrips (Thysanoptera) from Peru. [44] 42: 217-220, ill. Notes on Chirothrips, with descriptions of two n. spp. (Thysanoptera). [105] 10: 461-471. **Ioff & Tiflow.**—Materialien zum studium der Flöhe. III. Gattung Amphipsylla. [Rev. Microbiol., Epidemiol. & Parasit.] 16: 401-437, ill. [Russian with German summary]. **Jellison, W. L.**—Opisodasys, a gen. of Siphonaptera. [Journ. Parasitol.] 25: 413-420, ill. **Katzin & Kirby.**—The relative weights of termites and the protozoa. [Jour. Parasit.] 25: 444-445. **Maria, A.**—Catalogo de los Odonatos Columbianos. [44] 42: 206-211. **Mayo, V. K.**—New western Ephemeroptera. [55] 15: 145-154, ill. **Rehn, J. W. H.**—Studies in North American Mantispidae (Neuropt.). [1] 65: 237-263, ill. (k*). **Setty, L. R.**—The life history of Bittacus strigosus with a description of the larva (Me-

coptera). [103] 12: 126-127, ill. **Willey, A.**—Unilateral variations in the wings of a stonefly, Allocapnia lygmaea. [Trans. Ry. Soc. Canada] 33: 207.

ORTHOPTERA.—Liebermann, J.—Contribucion al conocimiento de los Pauliniidae neotropicales (Acrid.). [44] 42: 61-65, ill. **Piza, jr., S. de Toledo.**—Dois novos Phasmidas do Brasil. [105] 10: 444-446, ill. **Rehn & Rehn.**—A review of the New World Eumastacinae (Acrid.). [Proc. Acad. Nat. Sci. Phila.] 91: 165-206, ill. (Sk*). **Severin, H. C.**—The Brown-banded Cockroach [Supella supellectilium] in South Dakota. [12] 32: 595.

HEMIPTERA.—Beamer, R. H.—Two n. spp. of Pasadenus (Cicadell.). [55] 15: 190-191. **Couch, J. N.**—The genus Septobasidium. [Fungi] Symbiosis between fungi and scale insects. [31] 144: 531. **Davis, W. T.**—Cicadas collected in the Cayman Islands by the Oxford University Biological Expedition of 1938. [6] 47: 207-212, ill. (*). **Doering, K.**—A note on Fulgorids. [103] 12: 122. **Drake, C. J.**—Two new Tingitids from Panama. [5] 46: 68-69. Chilean Tingitoidea. [105] 10: 330-334. **Drews, E. A.**—A contribution to the knowledge of the Aphididae of Nevada. [55] 15: 175-178. **Hepner, L.**—N. spp. of Aligia (Cicadell.). [103] 12: 105-117. **Hungerford. H. B.**—Two new Corixidae from Mexico. [103] 12: 123-125, ill. A new Corixid from Mexico. [103] 12: 133-134, ill. **Monte, O.**—An undescribed Gargaphia from Venezuela (Tingid.). [44] 42: 292-294, ill. **Morrison, H.**—Taxonomy of some scale insects of the genus Parlatoria encountered in plant quarantine inspection work. [U. S. D. A.] Misc. Publ. 344: 34 pp., ill. (*). **Porter, C. E.**—Nota acerca de un Hemiptero acuatico (Gerrid.). [44] 42: 331, ill. (S). **Sampson, W. W.**—California Aphids of the gen. Phorodon. [55] 15: 173-175, ill. (*). **de la Torre-Bueno, J. R.**—Remarks on the gen. Elasmostethus in North America (Pentatom.). [55] 15: 186-187, (k). **Usinger, R. L.**—Protepiptera, a n. gen. of Achilidae from Baltic amber (Fulgorid). [5] 46: 65-67.

LEPIDOPTERA.—d'Almeida, R. F.—Contribucao ao estudo dos Mechanitidae (Rhopalocera). [105] 10: 277-281, (S*). **Bates, M.**—Notes on butterflies from Hispaniola. [5] 46: 43-51, (*). **Elgueta, P. N.**—Control de adultos y crisalidas de una Cuncunilia de la lenteja (Euxoa sp.). [44] 42: 95-97. **Field, W. D.**—A n. sp. of Plebejus from

Idaho. [103] 12: 135-136. **Giacomelli, E.**—El estudio del sexo ♀ en las mariposas. [44] 42: 302-303. **Heinrich, C.**—The proper scientific name for the Corn Ear Worm. [12] 32: 595-596. **Hemming, F.**—The question of the work in which ten generic names in the Lepidoptera Rhopalocera hitherto attributed to Fabricius were first described in 1807; a case for decision by the International Commission on Zoological Nomenclature. [107] B: 8; 181-191. **Janse, A. J. T.**—On collecting, preserving and packing lepidopterous insects. [Jour. Ent. Soc. So. Africa] 2: 176-180. **Kimball, C. P.**—The Lepidoptera of Nantucket; being a supplement to: "A List of the Insect Fauna of Nantucket, Massachusetts" by C. W. Johnson. [Publ. Nantucket Maria Mitchell Asso.] 111, no. 3; 53 pp. **Schaus, W.**—New neotropical lepidoptera of the family Notodontidae. [An. Carnegie Mus.] 27: 321-344, ill. **Snipes, B. T.**—Experiencias sobre o combate de Heliothis obsoleta, praga do milho (Noctuid). [105] 10: 289-309. **Ureta, R. E.**—Ropaloceros de la provincia de Coquimbo. [44] 42: 296-299. **Wild, W.**—The butterflies of the Niagara Frontier Region. [Bull. Buffalo Soc. Nat. Sci.] 19: 55 pp., ill.

DIPTERA.—Aitken, T. H. G.—The Anopheles maculipennis complex of western America (Culic.). [55] 15: 191-192, (*). **Alexander, C. P.**—Records and descriptions of Brazilian Tipulidae, Pt. V. [105] 10: 428-444, ill. (*). Records and descriptions of Chilean Tipulidae.—Pt. III. [44] 42: 276-282, (*). **Blanchard, E. E.**—Descripcion del Cecidomiido productor de la Agalla del quebracho blanco. [44] 42: 173-176, ill. (S*). **Boshell-Manrique, J.**—A n. sp. of Aedes from Colombia (Culic.). [105] 10: 309-312, ill. **Cantrell, W.**—Relation of size to sex in pupae of Aedes aegypti, A triseriatus and A. vexans (Culic.) [Journ. Parasitol.] 25: 448-449. **Fischer, C. R.**—O macho de Acanthocera coarctata (Taban). [105] 10: 334-337, ill. (S). **Fisher, E. G.**—Costa Rican Mycetophilidae. [1] 65: 227-236, ill., (*). **Fraga, G. A.**—El gen. Osca (Tabanidae: Pangoniinae). [44] 42: 66-74, ill. (Sk). **Gottschewski, G.**—Neuere genetische untersuchungen an Drosophila in ihrer bedeutung fur das abstammungsproblem. [Die Naturwissen.] 27: 585-593, ill., cont. **James, M. T.**—The gen. Dolichopus in Colorado. [1] 65: 209-226, (*). **Lenz, F.**—Die Chironomidengattung Coelotanypus. [34] 127: 177-184, ill. **Miller, R. B.**—The ecology of the Chironomidae of Costello Lake, On-

tario. [Trans. Ry. Soc. Canada] 33: 207. **Priddy, R. B.**—List of Bombyliidae collected in southern California and Yuma County, Arizona. [13] 31: 45-53. **Rempel, J. G.**—Neue Chironomiden aus Nordostbrasilien. [34] 127: 209-216, ill. **Sabrosky, C. W.**—A new North American sp. of Asteia. [55] 15: 165-167, ill. **Seguy, E.**—Etude sur quelques Mydaidae du Chili. [44] 42: 266-275, ill. (Sk*). **Stone, A.**—A revision of the gen. Pseudodacus (Trypetid.). [105] 10: 282-289, ill. (Sk*). **Townsend, C. H. T.**—Seven n. gen. of Brazilian Oestromuscarian flies. [105] 10: 446-452.

COLEOPTERA.—Bierig, A.—Litozoon y Xenaster, 2 generos nuevos de Staphylinidae. [44] 42: 176-180, ill. (S*). **Blackwelder, R. E.**—A generic revision of the staphylinid beetles of the tribe Paederini. [Pro. U. S. Nat. Mus.] 87: 93-125. (k*). **Blake, D. H.**—A study of Leconte's types of the beetles in the gen. Monoxia, with descriptions of n. spp. [50] 87: 145-171, ill., (k). **Borgmeier, T.**—Um novo coleoptero myrmecophile de Costa Rica (Staphyl.). [105] 10: 457-460, ill., (Sk*). **Bosq, J. M.**—Localidades y habitat Argentinas de un Coccinellidae de Chile. [44] 42: 341. **Cazier, M. A.**—A new Arizona Priocera (Clerid), with a key to spp. [55] 15: 162-164. **Chagnon, G.**—Contribution a l'étude des Coléoptères de la Province de Québec. [Le Nat. Canadien] 66: 197-205, ill. (k). **Dallas, E. D.**—Notable anomalia elitral en un Coleoptero Chileno (Cerambyc.). [44] 42: 115-117, ill. **Green, G.**—The biology of Lema sexpunctata (Chrysomel.). [103] 12: 128-132, ill. **Heikertinger, F.**—Ueber das Namenandern in Zoologie: Der Fall Chalcoides (Haltic.) als Schulbeispiel. [2] 35: 210-223. **Horn, W.**—A new Ctenostoma from Bahia (Cicindel.). [44] 42: 38-39, (S). **Liebke, M.**—Miscellanea Carabidologica Americana, Pt. V. [105] 10: 472-479, ill. (S*). **Obenberger, J.**—Hylaeogena grossel n. sp. [Casopis] 35: 20. (s). Callimicra obscurepurpurascens n. sp. [Casopis] 35: 28. (s). Hylaeogena tesari n. sp. [Casopis] 35: 49 (s). **Olave, O., L. E.**—Una nueva especie Chilena de Conognatha (Buprest.). [44] 42: 75, ill. **Orellana, O. B.**—Revision de los Elateridos Chilenos: III. El gen. Ovipalpus; IV. El gen. Antitypus. [44] 42: 163-165; 294-296, ill. **Parsons, C. T.**—A Ptilid beetle from Baltic amber in the Museum of Comparative Zoology. [5] 46: 62-64, ill. (*). **Porter, C. E.**—Introduccion al estudio de los Cerambicidos Chilenos. [44] 42: 221-231, ill. (k). Entomologia Chilena: Acerca de

una nueva Phytholaema (Scarab). [44] 42: 131-132. **Sanderson, M. W.**—Note on Ptomaphagus cavernicola in Arkansas caves (Leiodidae). [103] 12: 117. A new cave beetle of the subgen. Adelops (Leiodidae) from Oklahoma. [103] 12: 121-122. A family of Coleoptera, Brathinidae, new to Arkansas. [103] 12: 127. **Saylor, L. W.**—Notes and descriptions of United States scarab beetles. [91] 29: 452-459, ill. (*). **Spaeth, F.**—Ueber einige von Dr. G. Bondar im Staate Bahia gesammelte Cassidinen. [105] 10: 453-457, (*). **Timberlake, P. H.**—Two n. spp. of Acmaeodera from California (Buprest.) [55] 15: 179-182. **Ting, P. C.**—Pachybrachys hybridus (Chrysomel), a pest of heather. [55] 15: 182. **VanDyke, E. C.**—An ancient beetle (Buprestid.). [55] 15: 154. **Whelan, D. B.**—Blister beetles and ladybird beetles taken at a Nebraska light trap. [103] 12: 118-120.

HYMENOPTERA.—**Bischoff, H.**—Die Ausbeute der Deutschen Chaco-Expedition 1925/26: Hymenoptera, Chrysididae. [56] 17:271. **Borgmeier, T.**—Nova contribuicao para o conhecimento das formigas neotropicas (Formicid.). [105] 10: 403-428, ill. (*). **Cockerell, T. D. A.**—A new Colletes found on Santa Catalina Island. [55] 15: 188-189. **Cushman, R. A.**—A new Angitia, parasitic on the artichoke plume-moth (Ichneum.). [55] 15: 183-185. **Hopper, H. P.**—A synoptical revision of the tribe Trogini of the United States and Canada. (Ichneumon.). [1] 65: 307-346, ill. **Linsley, E. G.**—N. spp. of Andrenid bees from California. [55] 15: 155-162. **Linsley, E. G. & Michener, C. D.**—A revision of the North American Nomadidae. [1] 65: 265-305, ill. (*). **Mickel, C. E.**—A monograph of the Neotropical Mutillid gen. Hopolomutilla. [105] 10: 337-403, (Sk*). Correction of type locality for two species of Mutillidae described by Frederick Smith. [107] B: 8; 191-193, (S). **Minkiewicz, R.**—(see under Anatomy). **Richards, O. W.**—The British Bethylidae, (s. l.). [36] 89: 185-344, ill., (k*). **Ruiz, P. F.**—El Odynerus labiatus y su biologia (Vespid.). [44] 42: 97-105. Sinonimia de abejas Chilenas. [44] 42: 124-129. Nuevas especies de Abejas Chilenas. [44] 42: 148-153. **Sandhouse, G. A.**—The North American bees of the genus Osmia. [Mem. Ent. Soc. Washington] 1: 167 pp., ill. (k*). **Santchi, F.** — Etudes et descriptions de fourmis neotropiques. [105] 10: 312-330, ill. (*). **Smith, S. G.**—(see under Anatomy). **Wesson & Wesson.** — Notes on

Strumigenys from southern Ohio, with descriptions of six n. sp. (Formicid.). [5] 46: 91-112, ill. (k). **Windsor, A. S.**—Pyramids of Palos. [Chicago Nat.] 2: 67-72, 91, ill.

SPECIAL NOTICES.—Manual of Myiology.—Part VIII. By C. H. T. Townsend. 405 pp.

PRINCIPLES OF FOREST ENTOMOLOGY, Second Edition, by SAMUEL ALEXANDER GRAHAM, pages i-xvi, 1-410, 165 text illustrations. McGraw-Hill Book Co., Inc., New York, N. Y. 1939, $4.00.—The passing of a decade has been marked by the appearance of this most welcome second edition of the only book limited to forest entomology in North America. This, like the first edition, is a discussion of cause and effect in relation to insect injuries and the possibilities of reducing or limiting damage by forest insects. It is recognized that direct control measures are ordinarily too costly and the author has most properly stressed the possibilities of control by forest management, one being that suggested on pages 244 and 245 in the tabular and diagrammatic presentation of Keen's Ponderosa Pine Classes and Risks. The relation between age, relative vigor and insect injury is one deserving careful attention. It has applications to other insects as well as bark beetles.

Considerable new matter appears in this edition, namely a summary account of contemporary work and workers in America, a chapter dealing with some indirect effects of forest insects, such as insects and wood rots and stains, insects and parasitic fungi and insects and virus diseases. A number of forest pests have appeared since the first edition was published and among these the author includes excellent accounts of the European pine shoot moth and European spruce sawfly. There is also new matter on *Melanophila* beetles and the *Pandora* moth. The chapter on insect abundance with its discussion of biotic balance and the relation between abundance and environmental factors has been largely rewritten to include the investigations of the past decade.

There have been important and valuable additions to the revised book though these are mostly in detail rather than relating to broader lines. The volume is the one publication dealing with forest entomological problems in America. The entomologist will find therein much of value and the forester will do well to follow the general principles elucidated by the author.

E. P. FELT, Bartlett Tree Research Laboratories.

A CLASSIFICATION OF THE LARVAE AND PUPARIA OF THE SYRPHIDAE OF ILLINOIS, exclusive of Aquatic Forms. By ELIZABETH M. HEISS. University of Illinois Bulletin, vol. 36, no. 1. Comprising vol. 16, no. 4 of the Illinois Biological Monographs. 142 pp., 17 pls. with 146 figs. Price, $1.50. Students of insect taxonomy are coming more and more to realize the importance of a better knowledge of the immature stages and their morphology. In this field of taxonomy, this work of Dr. Heiss' should be a welcome addition to the library of students of the dipterous family Syrphidae, as well as those who are particularly interested in the immature stages of insects in general. Dr. Heiss prefaces her work by chapters on the family characteristics, food habits and pupariation, evidence of generic relationships afforded by the larvae, parasites, and other larvae resembling Syrphidae. The taxonomic treatment contains keys to the known genera, and descriptions and keys to the species found in Illinois. An appendix gives a list of known parasites, and four pages of bibliography. The value of the present work is mainly the compilation under one cover of what has been done by various students, particularly as applied to the species occurring in Illinois. The author has secured by her own collecting and by loans from others, specimens upon which her descriptions were drawn, and she has given plain, well delineated figures of the essential characters, although some of these are credited to other authors. The placing of the specific names beneath the respective figures is a commendable feature.—E. T. CRESSON, JR.

BATS BY GLOVER MORRILL ALLEN. Cambridge, Massachusetts, Harvard University Press 1939. Pp. x, 368, 57 figs. $4.00. An interesting book on almost all phases of bats, except —and this is no censure—that their anatomy and physiology are not described in great detail. Into this book insects enter in two ways, as food and as enemies, chiefly parasites, of bats. That the insectivorous habit was once common to the whole group of bats "is indicated," Dr. Allen says, "by the fact that the greater number of the species now living are insect feeders, while in some of the families there are those of transitional habits, and others that have now become altogether vegetarians." He has brought together data from many sources, based largely on microscopic examination of bat droppings and of stomach contents. Dr. J. W. Hamilton, Jr's. analysis of 2200 pellets of dung from the big brown bat (*Eptesicus fuscus*) in West Virginia is quoted as showing that of the determined insect

remains, 36.1% were Coleoptera, 26.3 Hymenoptera, 13.2 Diptera, 6.5 Plecoptera, 4.6 Ephemerida, 3.4 Hemiptera, 3.2 Trichoptera, 3.2 Neuroptera, 2.7 Mecoptera, 0.6 Orthoptera. Other bats, both in the Old and New Worlds, eat moths. "Probably it is safe to say that mosquitoes really form a negligible fraction of the diet of insectivorous bats." There are some slips in this part of the book, where *Agrotis* is referred to the Geometridae (p. 79) instead of Noctuidae, Hemerobiidae are called Mayflies (p.84) and Meloidae is spelled with two "ls" (p. 85). African driver ants are mentioned as occasionally attacking colonies of bats. The summary of arthropod parasites of bats is based on Stiles and Nolan's *Key Catalogue of parasites reported for Chiroptera* of 1931 (Bull. Nat. Inst. Health, U. S. Treasury Dept. No. 155) and papers by Ferris, including one in the NEWS for June, 1924. They comprise "over forty genera of mites and ticks," four genera of bedbugs (*Cimex, Cacodmus, Leptocimex* and *Loxaspis*), five genera of the Hemipterous Polyctenidae, one Dermapteron, *Arixenia esau* of Borneo, eight genera and ninety species of Nycteribiidae, and at least twelve genera of Streblidae, both families of Diptera. "No less than fifteen genera of fleas are listed from bats, and undoubtedly others will be discovered when more thorough search has been made for these pests."—P. P. CALVERT.

Iowa State College Press Established.

A new publication outlet for manuscripts dealing with science and technology has been provided at Iowa State College, Ames, Iowa, by the recent organization of the Iowa State College Press. The major purpose of the new Press, as outlined in its statement of editorial policy, is "to serve learning, and particularly learning in fields of science and technology, by providing a channel of publication." The new press will consider for publication manuscripts, not from Iowa State College alone, but from any source. It will be especially interested in developing publications in certain subject matter fields in science and technology for which satisfactory publication channels are not elsewhere available. The manufacture and sale of Iowa State College Press publications will be conducted by the Collegiate Press, Inc., also of Ames, a firm which entered the publishing field in 1934, and which has experienced a consistent growth since. Its books have been sold in more than 30 foreign countries as well as throughout the United States.

INDEX TO VOLUME L.

(* indicates new genera, species, names, etc.)

GENERAL SUBJECTS

OBITUARY NOTICES

REVIEWS

GEOGRAPHICAL DISTRIBUTION

COLEOPTERA

DIPTERA

HEMIPTERA

HYMENOPTERA

LEPIDOPTERA

NEUROPTERA AND ODONATA

ORTHOPTERA

NON-HEXAPODA